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THE MICRO USER

Volume 1
Number 4
June 1983
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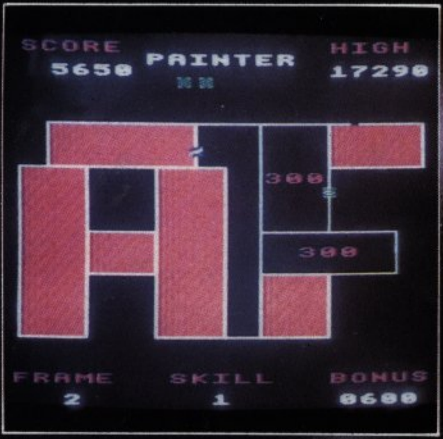
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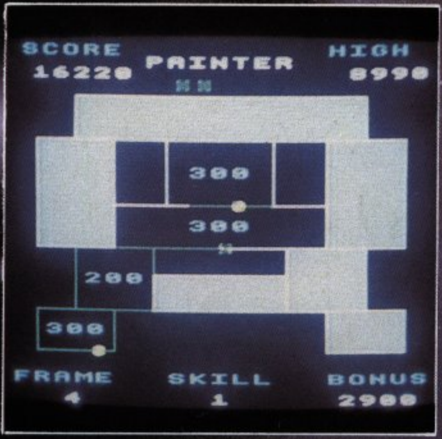
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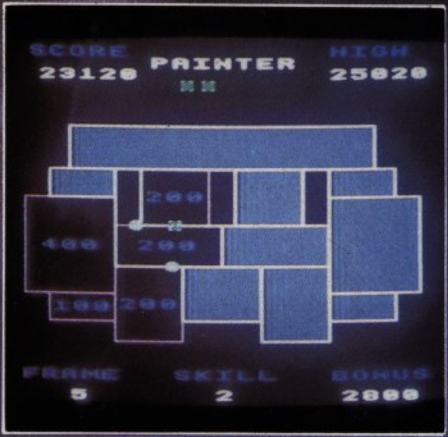
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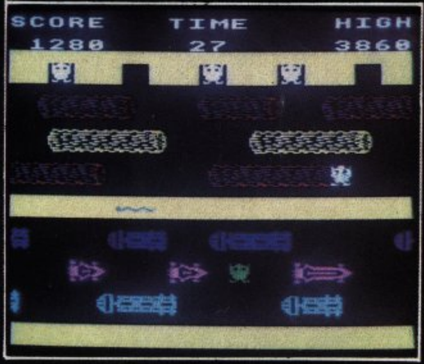
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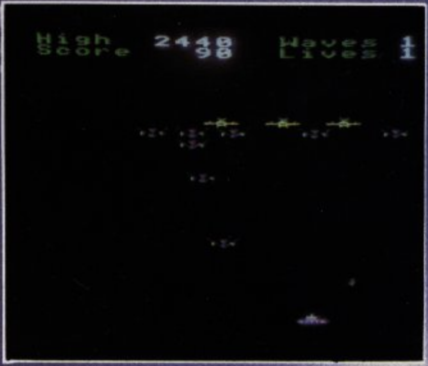
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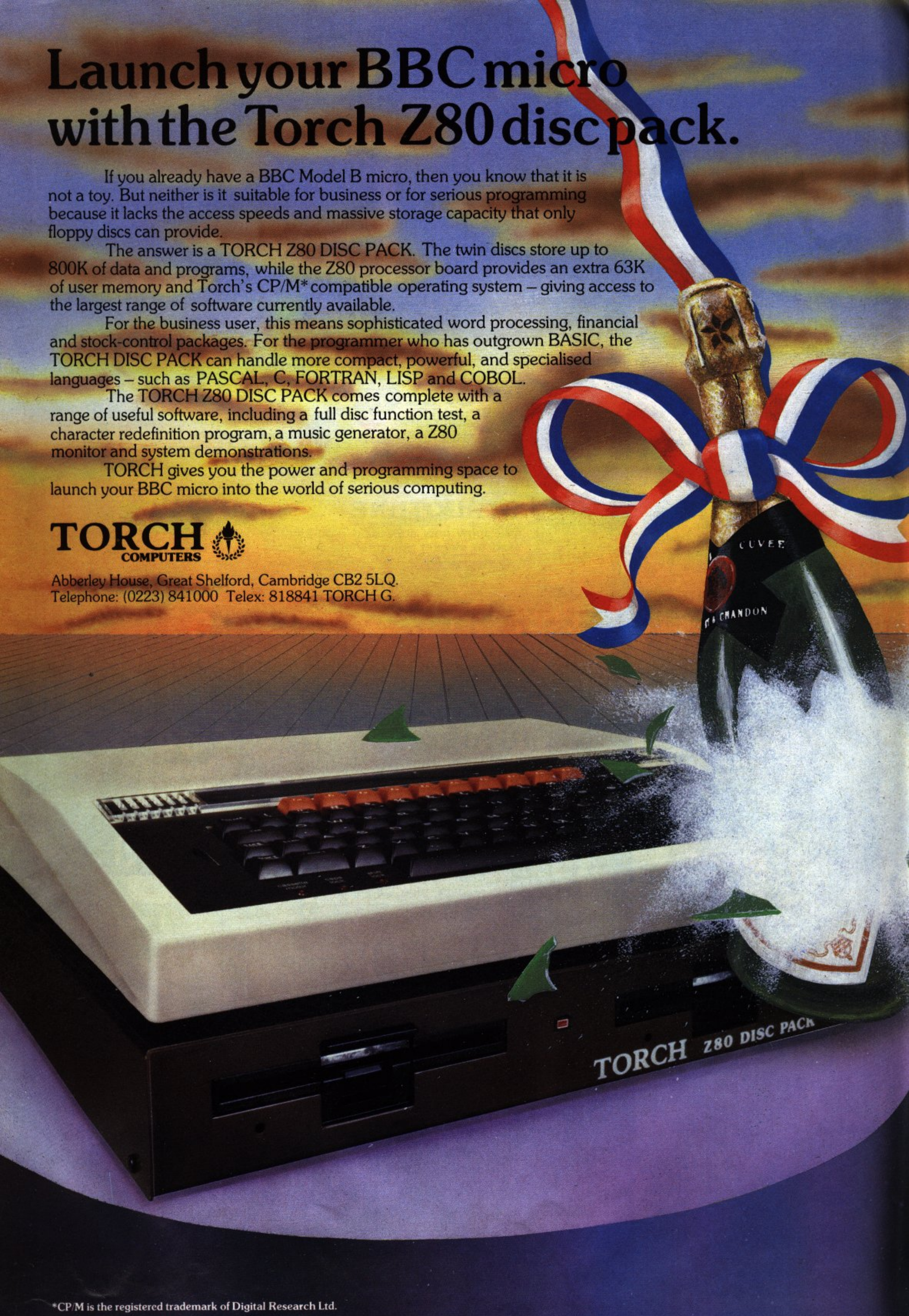

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Vol. No. 4 June 1983

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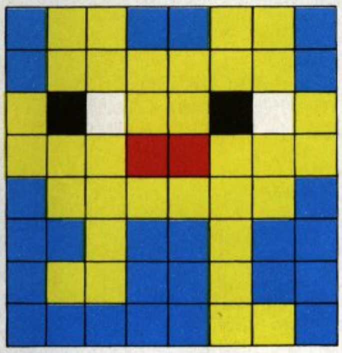

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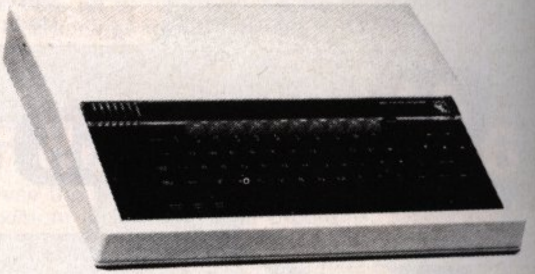

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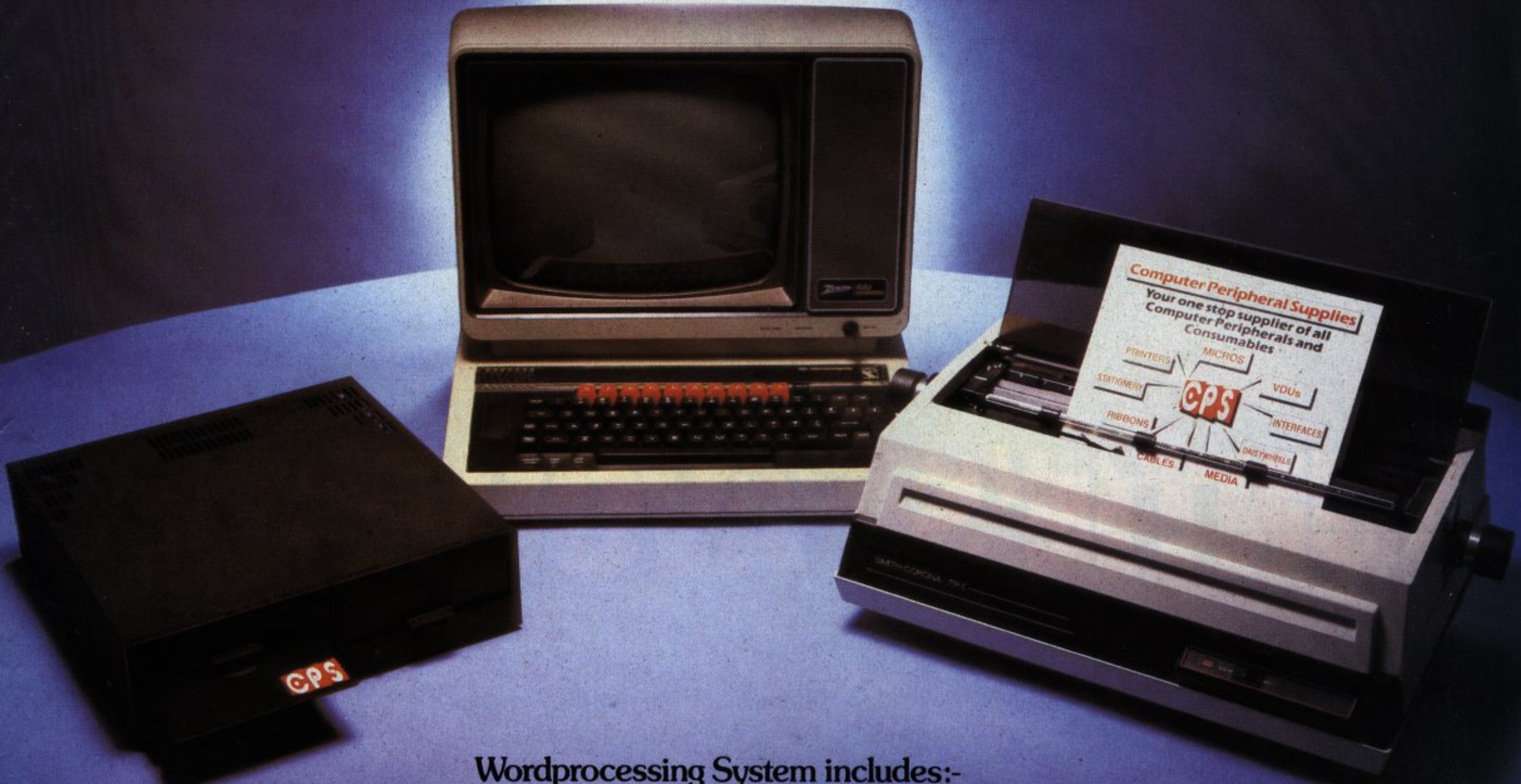
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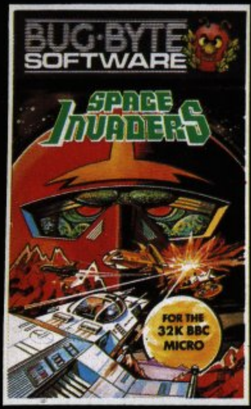
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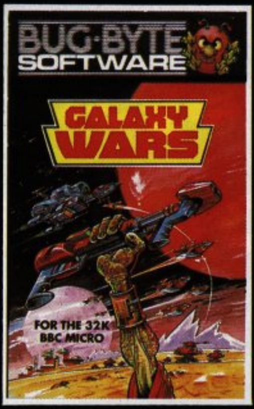
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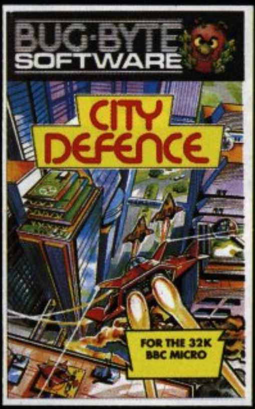
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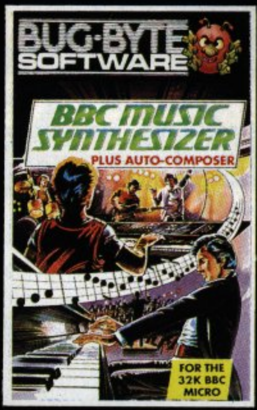
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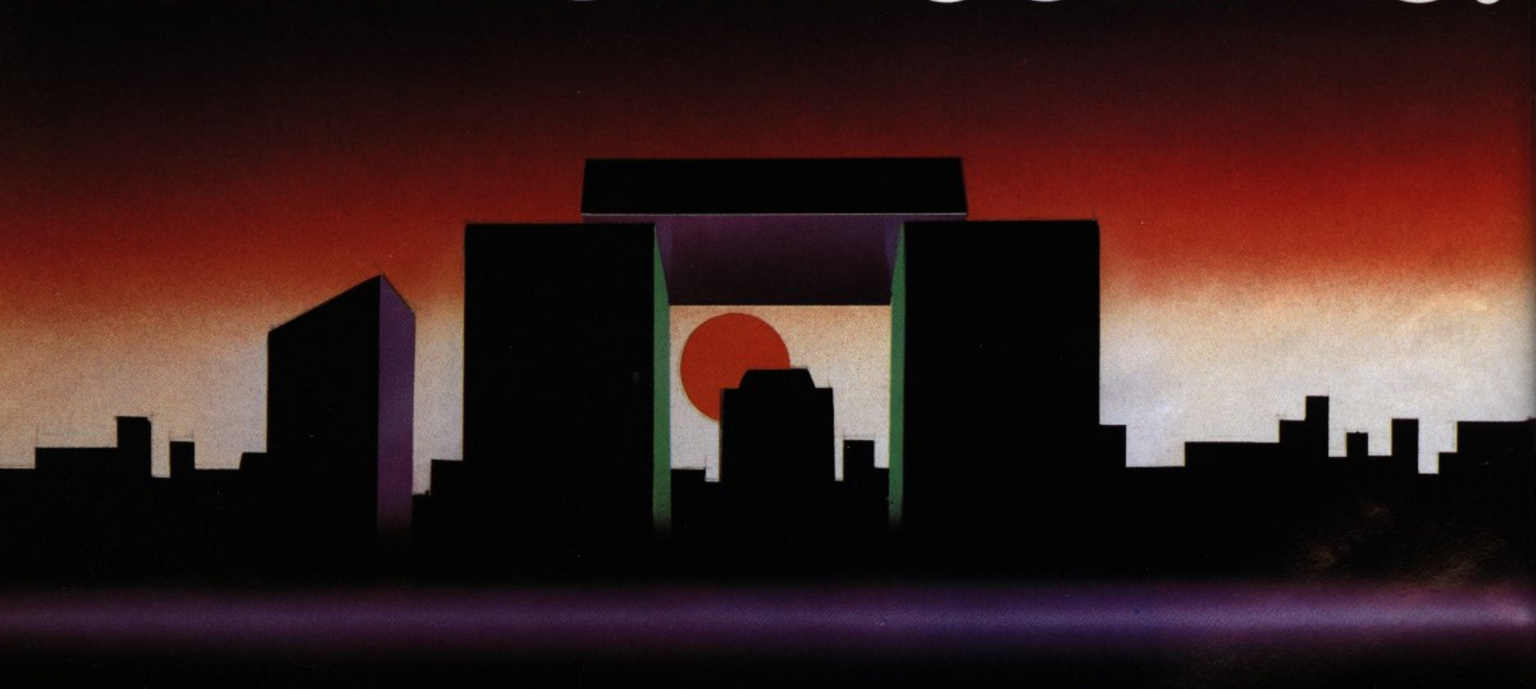

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THE MICRO USER NEWS

June 1983

Name changes for the worse

THE BBC Micro is to change its name! It has been rechristened the "British Broadcasting Corporation Microcomputer".

The change has been forced on the BBC and Acorn because of difficulties that have cropped up in the export field.

Apparently while the letters BBC mean only one thing to the insular British, abroad they are widely recognised as the initials of the Brown Boveri Company, a Swiss multinational.

Although nobody has registered BBC as a trademark in this country, owing to a "hands off" agreement between the two parties, Brown Boveri has registered it in most other countries.

This means that the BBC Micro can no longer go out with the logo "BBC Microcomputer" emblazoned on it.

So, all Acorn's production lines are now manufacturing the "British Broadcasting Corporation Microcomputer".

Riddle of missing BBC machines

WHERE are the BBC Micros? Acorn recently handed over its 100,000th machine and is increasing its production line by several thousand units each month – yet dealers and a clamouring public are complaining that there are chronic shortages.

At the same time while people are upset because they can't get hold of a BBC Micro, users who do have one say it is often unreliable and temperamental.

And the very dealers who complain about not getting supplies have been criticised in turn for contributing to the situation.

"Go back a few months to just after the Christmas rush and it was difficult to find a dealer who was prepared to commit himself to the market by placing a forward order," said Martin Jardine of Leasalink, Acorn's main distributor.

Frustrated

"Now that the market has been proven the dealers have increased their scheduled orders and demand instant response. But it is just not possible to turn Acorn's production line around overnight."

Jardine adds that some of the people making the most noise are frustrated would-be dealers who have taken orders for machines without any possibility of supply.

"It is a daily occurrence," he told *Micro User*, "Dealers set themselves up without making an approach to Acorn or ourselves, then they phone up and say 'I have an order, supply me'."

Other dealers are also trying to get equipment before their credit worthiness has been established.

Leasalink has now stopped appointing dealers for "at least three months" so that it can concentrate on meeting the needs of its existing network.

Leasalink itself is in a quandry. A visit there found crowded premises,

Turn to Page 10

Some exciting new lines on way

CUMANA is all set to launch an exciting range of new products for the BBC Micro which will greatly increase its capabilities.

Based around an expansion board which plugs into the tube, the system will enable the BBC Micro to be used with 6502, Z80, 8088, and 6809 second processors.

The board, which has slots for six cards, will also provide a hard disc interface, Prestel/teletext downloading and a networking system.

First out will be the Z80 card, with licensed CP/M, followed closely by the 6502.

Initially, both will support 64k as standard with a 64k expansion option. Later there will be a 256k RAM card. The units are due for phased release over the next six months.

Pre-production models of both the 6502 card and the hard disc interface will be on display at the BBC Micro User Show, to be held in Manchester at the end of June.

IMAGINE JOIN IN

SOFTWARE company Imagine has switched its allegiance from the Vic 20 to the BBC Micro.

"We've been writing games for the Vic but feel that it has now reached the end of its commercial life," said a spokesman. "The BBC Micro was the obvious choice to replace it."

Imagine's programming staff includes (from left to right) John Gibson, Eugene Evans and Dave Lawson. Evans has been the darling of the national press and media recently. They've portrayed him as a teenage whizz kid reputed to earn £35,000 a year as a programmer.

Those missing micros

From Page 9

staff seemingly bewildered, and shortages of essential distributor stocks such as spares, joysticks, printers and other peripherals.

One new dealer who arrived on appointment to place an order for hundreds of BBC Micros came away with one machine and no indication of when his full order would be met.

It is not as though Acorn isn't producing the goods – it is just that no one estimated the phenomenal demand for the product.

About 18 months ago Acorn staff were predicting an annual sales turnover of around 12,000 machines. The company is now producing that many machines each month.

It has also boosted production for May to 15,000 and will increase this to 17,000 in June.

Acorn's comments on the situation are delightfully ambiguous: "There isn't a shortage at all," said a spokesman, "it's just that demand exceeds supply."

It is difficult to establish reasons for the shortage other than that the market demand was wrongly judged.

Dealers complain that education authorities are being given priority, that machines are being stockpiled for sale in the US, that too many dealers are chasing too few machines, and that mail order sales of the micros have first call over dealer requirements because of a legal clause stating that the goods will be supplied within 28 days.

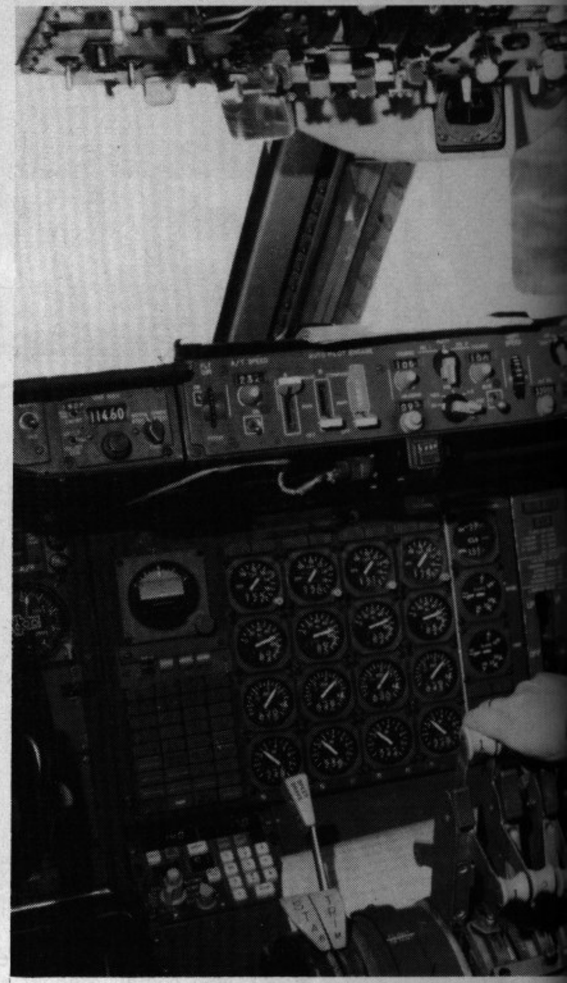
Acorn say that no machines are being stockpiled for the American market (it is understood that the company is required by the British Broadcasting Corporation to satisfy the home market in terms of supply and quality before exporting), that the mail order business makes up only seven per cent of total sales, and that the demand from the education sector was only a seasonal hiccup and one that brought business both to dealers and themselves.

It is understood that 4,500 BBC Micros were delivered to primary schools alone in March, and all educational establishments bought heavily to utilise budget allocations at the end of the school financial year.

Video micro link

A VISION analysis system which allows pre-recorded images to be transferred from a standard home video recorder to the BBC Micro has been developed by Digithurst.

The interface digitises pictures and allows analysis and subsequent storage of the information. It costs £295.



For the 20-pupil school . . a Micro

ONE of the smallest schools in Wales has just installed a BBC model B system for use by its 20 children.

Half of the £650 cost was donated by parents, with the rest coming from the government's MEP scheme.

Mr Michael Taylor, headmaster of Pentre junior school, near Wrexham, said he had treated the computer as a sophisticated toy at first, but was now convinced of its educational value.

The children – there are so few of them that girls have to play in the football team – are delighted with the computer and have already mastered the basics.

"With such a small school it is very easy for all of the children to gain maximum benefit," said Mr Taylor. "They have taken to it extremely well and I am sure they will be proficient in computer techniques by the time they move on to comprehensives."

FROM HIGH FLYING TO HIGH TECHNOLOGY

WHAT does a British Airways pilot do with his spare time?

In the case of Captain Roger Selby, he writes simulation packages for the BBC Micro.

And Selby, who was a co-pilot in a Jumbo jet *(see picture)* before assuming command of a TriStar, says not only has he found a hobby for life, but he has also improved his real-time navigation skills through writing and using his packages.

He recently released an enhanced version of his 747 Flight Simulator for the BBC, and is now busy working on a space simulation package "Relativity Starship", which simulates the correct 3-D positions of 50 local stars within 20 light years of the sun.

Obsession

The package incorporates "all the Einstein relativity effects, and makes one realise just how big space is," he said.

Selby (37) has had no problem in switching from the high technology aircraft cockpit to the BBC console.

"Computers have become an obsession with me and since their invention I've known that I'll never be bored again, he said.

He wrote his first 747 flight simulator 18 months ago for the Acorn Atom, but says the BBC version is much more realistic, and easier to use.

"I'm an absolute nut about the BBC Micro," he said.

'Can't wait for second processor'

"I'm particularly impressed with the ease with which machine code sub routines can be used in conjunction with the very fast resident Basic.

"However I only realised how good the Beeb machine was when I tried out other micros.

"Now I can't wait to get the extra processor options going on the machine."

He has also developed a space adventure program which he describes as a "think and zap and think again game." He says it is a new concept in which a player has to manage the play as well as compete in a straight forward confrontation.

Prototype versions of the packages were snapped up by Micronet 800 when it was first building up its telesoftware base for the BBC Micro.

Enhanced versions are now being marketed through Doctor Soft, a company Selby set up with Peter Chilcott, himself a former pilot.

★ ★ ★

H & H Software has announced that Alphabeta, its word processing package for the BBC Micro, has been reduced in price from £28.50 to £14.50 for the cassette version.

Also released – a disc version for £16.

Happy with their chips

ACORN have revealed they are second-sourcing their ULA chips. This means that they are to obtain this vital component from both Ferranti and another, as yet unnamed, supplier.

Despite rumours to the contrary, Acorn strongly deny that this is due to any dissatisfaction with Ferranti, previously their sole supplier.

They state that they are doing what any sensible company would do to ensure future requirements are met. Ferranti would continue to be a valued source.

Acorn's concern with future supplies of chips is probably well justified, particularly in view of the great difficulty in obtaining disc upgrade kits. This is due to a scarcity of the 8271 disc controller chip.

Acorn instal more lines

THAT long catalogue of complaints from users unable to get through to Acorn should be at an end. The company's customer services department has been tripled in size – and eight telephone lines installed.

The number to ring: 0223 210111.

According to customer services manager Mike Bignall, more phone lines will be added as required, and he anticipates his staff of 12 will go up to 18 within the next 12 months.

Stringent

That's providing he can find the right people. Dealing with customers' problems requires tact and understanding, and Mike is not finding it easy to recruit people who meet his stringent requirements.

Phone queries only account for one aspect of the department's activities. Letters appealing for advice are pouring into Acorn's Cambridge headquarters at the rate of more than 100 a day.

Says Mike: "We are aiming to reply to a general enquiry within a week. A more technical enquiry may take up to a fortnight."

The address to write to is Customer Services Department, Acorn Computers, Fulbourne Road, Cherry Hinton, Cambridge.

★ ★ ★

THE 1000,000 BBC Micro has been presented to Charing Cross Hospital. BBC Breakfast Time's Selina Scott presented it to the hospital's speech therapy unit.

The micro will play a key role in the unit's new venture, a Communication Aid Centre, which opens next month.

Software winner

THE winner of the software contest in the April issue of BBC Micro User was Mr Anthony Withall of Sheffield. As his prize he will be receiving a box of software from the Acornsoft range every month for the next year.

New disc filing system is due

A NEW disc filing system for the BBC Micro is due to be released in mid-June. Developed by Kenda Software, DMFS – which stands for Disc Management Filing System – hopes to overcome many of the limitations inherent in the present BBC Micro DFS.

The new system places no restriction on the number of files you can have on disc, unlike the present DFS, which allows a maximum of 31 files.

There is also a facility to allow recovery of inadvertently deleted files.

Appealing

"This should make it particularly appealing to first time and educational users," said Kenda director Alan Horner.

DFMS permits file names of up to eight characters plus three qualifiers, overcoming another disadvantage of the present DFS.

These filenames are CP/M compatible, and DFMS will read CP/M standard discs, allowing the BBC Micro to load up programs written on CP/M machines.

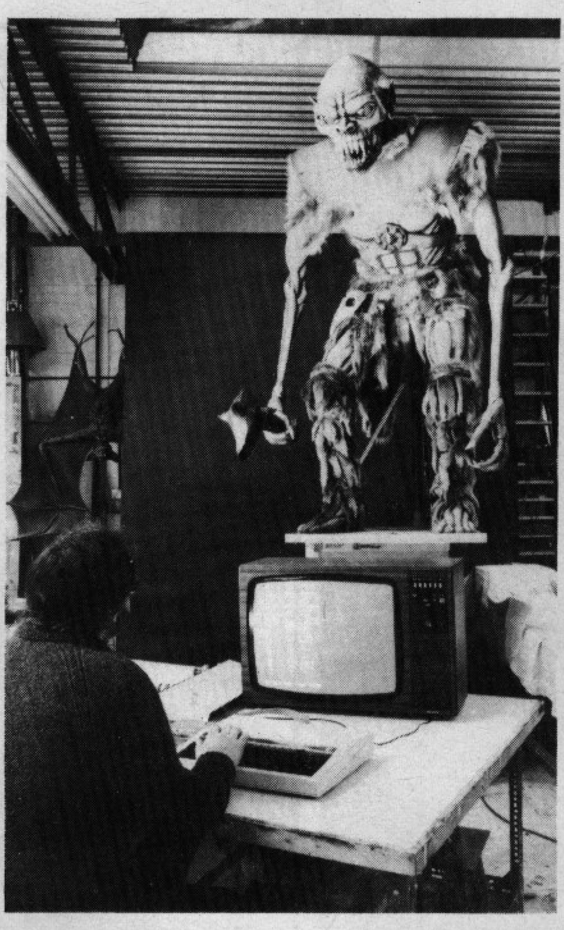
DFMS can stand alone or work alongside the present DFS, and provides a utility to transfer files between the two systems.

Because it is hardware based, the system also allows the user to access the whole of the BBC Micro's 32k RAM, as well as providing an extra 1.5k of memory itself!

Disc copier

The first protected-disc copier for the BBC Micro has just been released by Clares. Called The Key, it will enable the user to take back-up copies of most protected discs, and also allow copying of individual tracks and sectors.

Clares stress strongly that the program, which sells at £12.95, is meant solely as a utility to enable "safety" discs to be made. A condition of sale is that the disc must not be used for software piracy.



Not the line for lasses?

MICROSTYLE are still looking for a female computer engineer.

Following the story in April's BBC Micro User, they did manage to find one, though they had to import her from Germany. However she has since left them to take up a full time course in computer engineering.

"We've had scores of male applicants for the job, but very few women," said Lyn Farmer, managing director of Microstyle.

"The trouble is that, although they've got the talent, women just haven't been given the opportunities for training that men have.

"If we could find a woman with the appropriate training we would seriously consider her."

Devilish clever, these Beebs

A TEN foot tall demon, currently on display in Great Yarmouth, owes much of its "life" and movement capabilities to a BBC Micro.

It was built for a chamber of horrors show by N.J. Farmer Associates, but the company encountered a major problem when trying to synchronise its movements with a horror music sound track.

"We tried it manually with an electronic coding device, but didn't have enough fingers and thumbs to press the buttons needed to get him to open his mouth in time," said Nick Farmer.

"So we bought a BBC Micro and with it were able to program the demon's movements and lighting with lip synch accuracy. We have managed to achieve an effect of stunning and very frightening realism."

The completed program has been transferred to a spare track on the audio cassette tape loop which drives the monster.

Desmond, as the demon is affectionately called, is made of various plastics and rubber over a steel skeleton, and has eye, jaw, neck, waist and leg movements working in conjunction with a lighting sequence.

The movements are operated by pneumatic cylinders controlled by electric solenoids and valves.

BARRY WOOD'S TAILPIECE

IT'S really a shame the way so many commentators keep on having digs at Acorn.

The latest is caustic Peter Craig, columnist of the industry's trade newspaper, *Computer Dealer*, which has always had nice things to say about Acorn in the past.

In the latest issue he complains that the Acorn phone number – 0223 245 200 – is engaged "168 hours a week," and he adds:

"Being permanently engaged might make it difficult for important staff to ring out, so they all have special private ex-directory numbers. Next month this column will list them."

★ ★ ★

IT may not have been the Pulitzer Prize but for me it meant as much: Acorn's PR man sent a letter to the editor complaining about my column.

I'd love to quote from it but, in line with Acorn's usual open policy, the document's not for publication. After all, it might be bad for public relations . . .

★ ★ ★

A LITTLE bird (an Owl actually) tells me that the BBC are all set and ready to go with their telesoftware launch. Only they've had to delay it.

Apparently, those awfully clever folk in Cambridge have produced so few telesoftware units, and at such a price, that the BBC is afraid of getting into the Guiness Book of Records for broadcasting to the lowest audience ever.

★ ★ ★

FOLKS, the second processor's nearly here. At least, version one is.

According to an Acorn spokesman – you can always tell them as they're the ones who say "but don't quote me" – the 6502 version coming out will give you only 32k of extra user memory.

You see, the 6502 addresses 64k: the copied-over Basic takes up 16k of that, and the part of the OS they transfer takes up another 4k.

That might add up to only 20k but, as Acorn haven't relocated the code with the bootstrap, the other 12k is wasted.

Don't worry, though, there's going to be a second version out in the near future. Well, knowing Acorn, there would be, wouldn't there? But don't quote me.

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Includes a whole host of other useful utilities — string search, function key editing, the ability to format 35, 40 & 80 track disks.

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Printer toolkit ROM

This includes routines for high resolution screen dumps for both the EPSON and NEC printers. Will work in any graphics mode with automatic grey shading of all screen colours. The most useful feature of this program is its 'spooling' capability, this enables data such as a program listings or high res screen dumps to be automatically spooled from your disk to the printer **while** using your BBC machine for running other programs.

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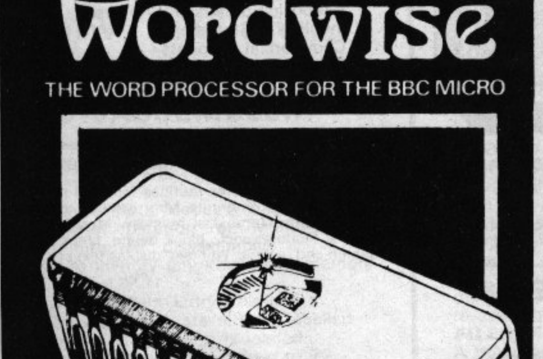
THE WORD PROCESSOR FOR THE BBC MICRO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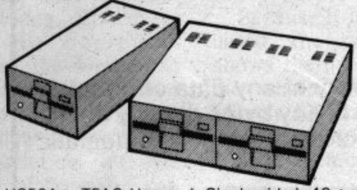

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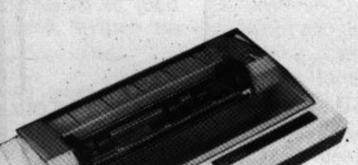

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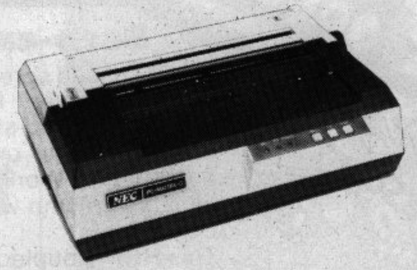

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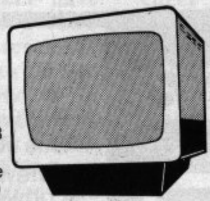

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LISTen carefully...

We have ways of stopping your precious program taking a mad scroll all over the screen

THE editor passed my desk,

"Look everyone", he screamed excitedly, "he's writing, he's actually writing."

He came closer and looked over my shoulder.

"COPY, eh? Well, plagiarism is what you're good at. Come on, come on, what about LIST and RENUMBER?"

With that he walked back into the office.

"He's forgotten LISTO," I thought to myself.

"And that's not mentioning LISTO," he added, door ajar.

You probably know what LIST does but, if not, here goes . . .

IF you type in LIST and press the Return key the computer will display on screen all the lines of any program in memory. Simple isn't it? So if you've entered a program into the machine and you want to show your masterpiece to admiring friends just type in LIST.

Sadly, if your program has more lines in it than the micro can display on screen what happens is that the lines whizz through until the end of the program just fits. The last line of the program fills the last line of the screen.

So, unless you've got very fast eyesight, all you get for your LIST is the last 25 or 32 lines of your listing (depending on the mode you're in).

Obviously this isn't good enough and there are a couple of ways around it. One way is to limit the effects of the LIST command to the bits of the listing you want to see. This is easily done using a combination of the LIST command, commas and the relevant line numbers.

If you just want to see one line, say line 100, then type in

LIST 100

and press Return. This will display line 100 or whatever number you choose.

You can also select chunks of your listing by using a comma. For example:

LIST 200,300

will give you all the lines between 200 and 300, inclusive.

LIST 0,100

will give you all the program lines between 0 and 100, though they may not fit on the screen.

In fact, you don't have to put in the zero. You can display all the line numbers from the beginning of the program to, say, line 500 by entering LIST,500. The system will assume the zero for you.

Knowing that, it probably won't come as any surprise to learn that typing in:

LIST 400,

will give you all the lines from 400 to the end of the program.

Using these commands, you should be able to list any section of the program you want. Even so, if you happen to list out too many lines you'll still get the "fruit machine" effect as the screen scrolls upwards madly trying to display all the lines at once.

By NIGEL PETERS

The way to get round this is to use the CTRL key, which we met earlier, to put the machine in "paging" mode. To do this you press the CTRL key and the letter N at the same time. Now when you type in LIST, the program is displayed one "page" (or screenful) at a time. If you want the next page you just press the SHIFT key.

When you've finished with the paging mode you just press the CTRL key and the letter O at the same time. The screen now goes back to its normal state (known as scroll mode).

I may as well tell you that if you're idle, like my editor, you don't have to type in LIST in full. L. will do the same job.

Now you can display the part of the listing that you want, you may find that you would like to erase part of it.

You can get rid of any particular line number by merely typing in that line number and pressing the Return key. This is obviously a bit pedestrian if you want to erase a lot of lines.

Alternatively you can get rid of the whole lot by entering NEW, which seems a bit drastic.

Happily there is a middle way between these two extremes which involves the use of the DELETE command. Now this is *not* the same as the DELETE key we met earlier.

The DELETE key only works on lines at the bottom of the display *before* they have been entered into the computer. This means that it won't work on lines in listings which display the program that is already in the micro's memory.

What you do when you want to get rid of a group of lines at a time is to type in DELETE, letter by letter, specifying the numbers you want to erase, and then press the Return key.

Suppose you want to get rid of a chunk of lines from 200 to 300. You type in:

DELETE 200,300

and press the Return key. Lines 200 to 300 will disappear.

Similarly, if you want to get rid of the first 400 lines of a listing you enter:

DELETE 0,400

You have to put in the zero. Unlike LIST the system will not assume it.

Editing can be easy

If you want to delete from a certain line number to the end of the program you use DELETE again. You'll have to tell the machine what the last line number is or, if you can't remember it, just use one that's bigger.

For example;

DELETE 400,30000

will get rid of all the lines between 400 and 30000 inclusive and is almost sure to get rid of all the lines to the end of the listing.

If you want to be absolutely sure the highest line number the BBC Micro will allow is 32767. So:

DELETE 400,32767

will delete all the lines from 400 to the end.

You have to state a line number to terminate the command. DELETE 400, will not work.

Again, if you're lazy you can just enter DEL. instead of typing DELETE in full.

Once you've done all this deleting and copying your program might be in a bit of a mess. For a start, it's unlikely that the line numbers will be consecutive. You'll find from experience that this can lead to problems as well as making the whole thing difficult to read.

Also you might find you want to squeeze 20 new lines in between line number 7 and line number 8, which isn't easy!

Of course you could use the editing facilities mentioned earlier to sort it all out (figure it out yourself!) but there is a better way. Those clever people at Acorn have allowed for your needs and the BBC Micro has a nice little command, RENUMBER.

If you type in RENUMBER and press Return the micro automatically renumbers your program, the first line becoming line number 10, the second becoming line number 20 and so on in increments of ten until the end of your program.

If for some reason you want to change the increments or start renumbering at somewhere other than line 10, you can. For example RENUMBER 300 will cause the renumbering to start from line 300. The increments, as you haven't specified anything else, are ten by default.

RENUMBER 1000,3 would start the renumbering process at line 1000 and this time the increments would be in 3s. Hence the line numbers would be 1000,1003,1006 and so on.

But what about GOSUBs and GOTOs? Well, provided you haven't been too clever in your programming RENUMBER will take good care of them. Example 1 makes this clear.

```
10 REM EXAMPLE1
20INPUT "ENTER 1,2,OR 3",X
30ON X GOTO 40,60,80
40PRINT"ONE"
50GOTO100
60PRINT"TWO"
70GOTO100
80PRINT"THREE"
90GOTO100
100END
```

It takes the input, a numeral 1, 2 or 3 and it prints out the number you have picked as one, two or three. Run it a couple of times, then use the RENUMBER facility to renumber your program as you will, such as RENUMBER 20,3.

Now run the program again and it works as before. Enter LIST and you'll see that the line numbers after the GOTO have been correctly adjusted.

```
10REM EXAMPLE2
20INPUT "ENTER 1,2,OR 3",X
30ON X GOTO 40,X*30,80
40PRINT"ONE"
50GOTO100
60PRINT"TWO"
70GOTO100
80PRINT"THREE"
90GOTO100
100END
```

Example II does exactly the same thing, only here notice that we calculate the second line number after the GOTO, such as X*30. Run it and you'll see how it works.

Now use RENUMBER 100 and you

→

From Page 17

get Example III:

```
100REM EXAMPLE3
110INPUT "ENTER 1,2,OR 3",X
120ON X GOTO 130,X*30,80
130PRINT"ONE"
140GOTO190
150PRINT"TWO"
160GOTO190
170PRINT"THREE"
180GOTO190
190END
```

Try running it and you'll get a message "no such line at 120". If you list the program you'll see that RENUMBER 100 works on line 120 to produce:

120 ON X GOTO 130,X*30,80

What has happened is that RENUMBER has worked up to where the calculation comes in and then fails for that line and the ones after it!

What's worse is that if the uncalculated lines exist you might end up in the wrong part of the program and, if it doesn't crash immediately, you may not notice it. Try RENUMBER 20 and see what happens.

You can imagine what might happen in longer, more complicated programs using calculated GOTO lines. So beware RENUMBER and line calculations!

Finally, just to prove it works for GOSUB here is the same old program using subroutines:

```
100REM EXAMPLE4
110INPUT "ENTER 1,2,OR 3",X
115GOSUB120
116END
120ON X GOTO 130,150,170
130PRINT"ONE"
140GOTO190
150PRINT"TWO"
160GOTO190
170PRINT"THREE"
180GOTO190
190RETURN
```

Now RENUMBER it as you choose and it will still work.

Incidentally, if you try doing something like RENUMBER 1000,5000, which takes you beyond the possible number of line numbers, the error message you get is rather apt. Try it!

So far we've covered the DELETE key, the COPY facility, LIST, DELETE and RENUMBER. That only leaves LISTO and then the editor might get off my back.

Now LISTO is a kind of addition to the LIST command we met earlier. Using LISTO you can affect the format of the display you get when you use LIST to get a listing.

LISTO can be used to make a listing easier to read and its structure easier to grasp. You pick the particular LISTO option you want and when you next use LIST you get the listings with spaces inserted where you have specified.

You can have these spaces after the line number, in FOR ... NEXT loops and also in REPEAT... UNTIL loops, or any combination of them depending on the number you add on to LISTO.

But remember that LISTO won't magically affect any listings already on the screen. It only works on the listings you call *after* selecting the LISTO option.

Also, you still have to use LIST after using LISTO – the latter does not automatically LIST for you.

The number you add on to LISTO to specify the option you want is made up by adding together a selection of numbers from the following menu:

0 *means no spaces will be inserted.*
1 *will put in a space after a line number.*
2 *will put spaces in to indent FOR ... NEXT loops.*
4 *will do the same for REPEAT ... UNTIL loops.*

What you do is decide which options you would like, add the menu numbers together, and put this controlling number after LISTO.

For example, if you want to have spaces after line numbers and also indent REPEAT ... UNTIL loops, you just add together the menu numbers for each.

In this case you will add 1 (for line numbers spaces) and 4 (for REPEAT ... UNTIL indentation) to get 5 and enter LISTO 5. Now when you enter LIST the listings you will get will be in this format.

All listings will be in this format until you change the LISTO option, or switch the machine on and off again when it will automatically assume LISTO0, with no spaces inserted.

Similarly, if you wanted a space after line numbers and indentations in FOR ... NEXT loops it would be 1 plus 2 and the command is LISTO3.

In practice you tend to find yourself using LISTO0, with no spaces inserted, and LISTO7, which gives you all the spaces available (1+2+4=7!). LISTO7 makes your listing very easy on the eye but it uses up a lot of space.

LISTO is easier to grasp in practice than in theory, like most things on the Beeb. Try typing in a program which has both kinds of loops and practice using the LISTO options from 0 through to 7 to see what happens to your listings. Notice how LISTO0 undoes the effects of any previous LISTO options.

Also notice that LISTO only works once on a listing. For instance, you can't use LISTO1 twice to get two spaces inserted after the line number.

Beware combining COPY and LISTO options. If you are in any of the LISTO options other than LISTO0 you can drive yourself crazy when you COPY.

What happens is that when you COPY a line and enter it using Return, the system forgets whether or not it has already inserted a space. It looks at the LISTO option and when you next use LIST it shoves in the required spaces, which can make your new line the odd one out in the listing.

As an example, type in LISTO0, press Return and enter:

```
10REM SPACES
20REM SPACES
```

Enter LISTO1, LIST and you'll get:

```
10 REM SPACES
20 REM SPACES
```

Now use COPY to copy line 20 and enter it. It looks alright doesn't it? Use LIST and you get:

```
10 REM SPACE
20  REM SPACE
```

The micro has copied line 20 exactly, including the space inserted under LISTO1, and treats it as a new line. So when you use LIST it goes through the listing, doesn't bother inserting another space in line 10 as it already has, but does in line 20, as it thinks it's new.

Try COPY on line 20 again. Now LIST and you'll get:

```
10 REM SPACE
20   REM SPACE
```

As you can see this can play havoc with the nicely ordered format of your listings. Sadly you can't use LISTO0 as a remedy, it only takes away the last space. Try it on the above and you get:

```
10REM SPACE
20  REM SPACE
```

The lesson is to avoid using COPY in anything but the LISTO0 option, otherwise you run the risk of getting extra spaces all over the place. Once you've got your listing correct you can then use the other LISTO options to make it more readable.

And now we've reached the end. I think you'll agree that none of what we've covered is particularly hard. All you'll need is a little practice and you'll soon have command of the BBC Micro's editor.

Which is more than I have of mine!

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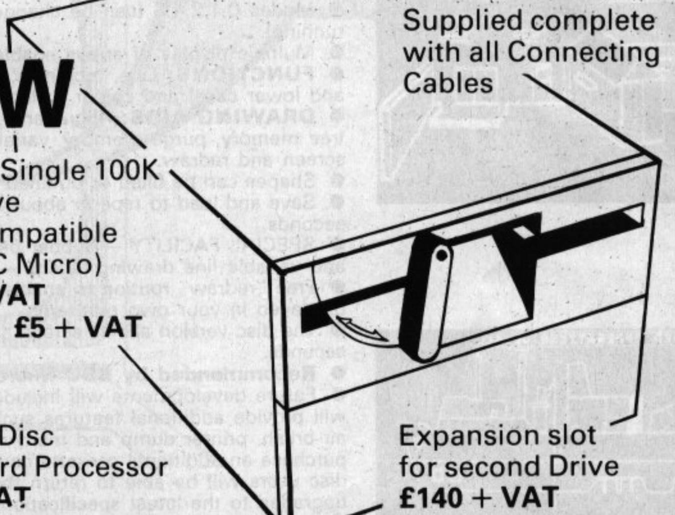

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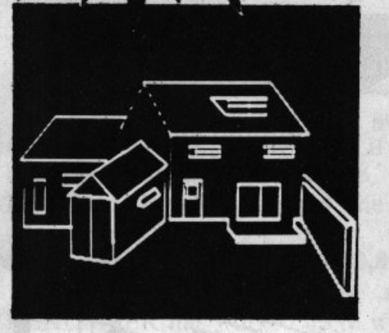

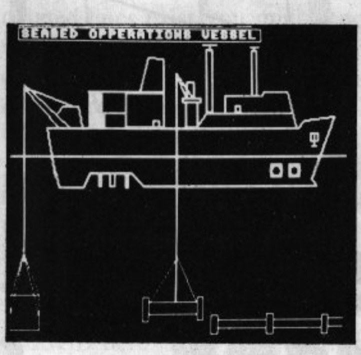

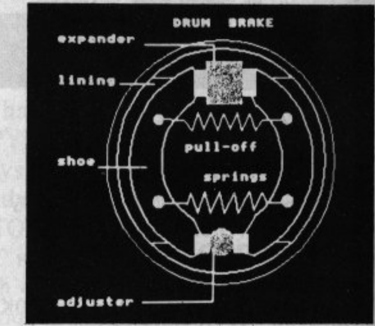

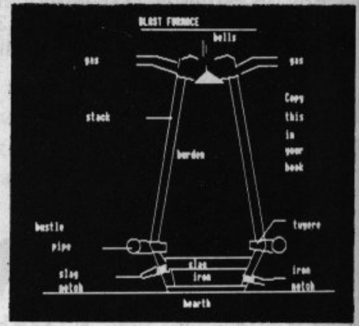

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(the examples shown are all unretouched off-screen photographs of some of the program's capabilities).

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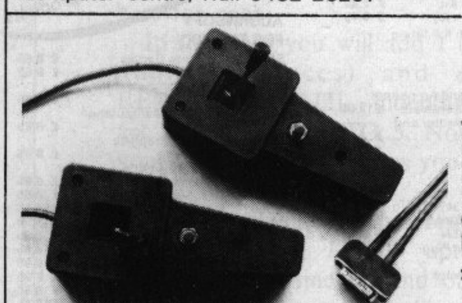

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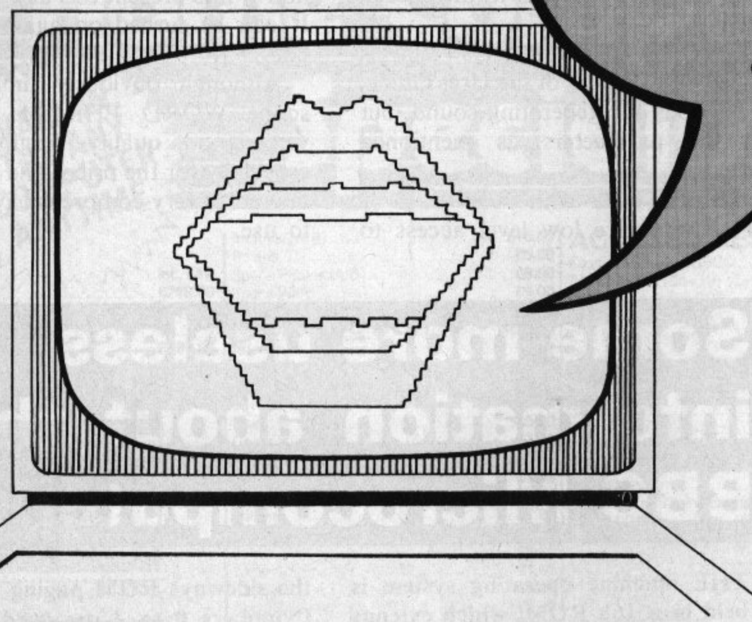

BY the time you read this the speech system for the BBC Micro may well be easily obtainable. On the other hand, you may still be whistling in the wind ... Before I describe some of the operational features I'll detail the major hardware additions and how I obtained them.

The speech system consists of two Texas Instrument devices:

- The TMS 5220 voice synthesis processor contains a digital filter and simulates the human vocal tract. It requires a large amount of data to make speech, and although the processor can be accessed directly, the synthesis of speech is a difficult task. This is where the second device comes in ...
- Actual word parts and words are stored in a 128k bit TMS 6100 voice synthesis memory or phrase read only memory (PHROM).

Both devices are mounted on board in positions IC 98 and IC 99. The full upgrade consists of the above devices plus two sockets to the left of the keyboard (the ashtray on early models) where cartridges can be plugged in the future. Presumably these will be extra PHROMs or ROM cartridges (hence *ROM?).

The PHROM supplied is known to Acorn as WORD PHROM A and a phone call ascertained that they have no immediate plans for a successor. Texas Instruments, however, have a few different ones available. They come in 128k bits and 32k bits costing £15.27 and £11.92 respectively:

128k

(a) Industrial
(b) Weather time
(c) Military
(d) Avionics

32k

(e) Talking clock
(f) Sound effects
(g) Telecoms

The speech add-ons had been ordered last September and a local dealer supplied a temporary manual in April. Within a week my original dealer said the chips had arrived sans manual and ROM slots. The chips were liberated and fitted, but not a word was heard.

Next day the aforementioned call to Acorn lifted the veil.

The system would only work properly without modifications if the micro had an Issue 4 board with OS 1.2 fitted. The full upgrade (with ROM slots) was not finalised, and I shouldn't really have the ICs anyway.

On refitting to a suitable machine all the facilities mentioned in the manual worked.

On eventually getting down to using speech, WORD PHROM A was disappointing. The words and word parts available number 165, but are in themselves a little limited, although easy to use via the existing Basic command SOUND.

```
10  SOUND -1,160,0,0:REM 'Acorn'
20  SOUND -1,179,0,0:REM 'computer'
30  SOUND -1,122,0,0:REM '-z'
40  SOUND -1,257,0,0:REM 'score'
50  SOUND -1,162,0,0:REM 'again'
```

The first parameter (−1) tells the operating system the SOUND statement is a speech system command.

The second parameter relates to the

→

From Page 21

word or word part required in the PHROM.

The last two parameters are always zero and must always be present.

There are other ways of accessing the speech system from Basic, which will be mentioned later.

An appendix in the manual gives a list of words which can be made up from words or word parts and speculates that the user can think of many more. They would be useful for simple prompting and simple mathematics, but not for much else.

Cutting up preset words in the PHROM or accessing the processor directly allows you to form your own words. The first requires a lot of experimentation and patience, the second an understanding of the parameters used by the speech processor – there can be up to 13 of these.

Besides being difficult this second method, eats up large chunks of memory. The word "zero", for example, takes up 144 bytes in its definition.

Word numbers 32 to 126 have an association with the Ascii characters of the same number, that is:
SOUND −1,56,0,0 and SOUND −1,ASC("8"),0,0 will both give "EIGHT".

Numeric characters will give numbers as above. Upper case letters will produce letters of the alphabet and lower case letters and remaining characters will produce words with some kind of association, for example

">" gives "large"
"P" gives "P" or "pea"
"a" gives "and"

The first parameter for SOUND can be given as a four digit hexadecimal number, its value indicating the action to be taken with the other three parameters. Four values can be used:

Value	*Action*
&FFFn	Speak using word number 'n'
&FFBn	Speak using absolute address in PHROM 'n'
&FF60	Speak from RAM. This initialises the speech processor.
&FF00	Speak from RAM

Acorn has given WORD PHROM A the number 15 (&F). Hence SOUND −1 (−1=&FFFF). The speech system will allow you to access up to 16 word PHROMs.

To produce a word using the absolute address is just as simple as using SOUND −1. Here are four ways of producing the word "illegal'.

```
SOUND −1,108,0,0
SOUND &FFFF,108,0,0
SOUND −1,ASC("i"),0,0
SOUND &FFBF,&1E3E,0,0
```

There are also two operating system calls which allow access to the speech system.

OSWORD call with A%=&07 is detailed on page 461 of the User Guide. Its use is as for generating sound, but with the parameters as mentioned above.

OSBYTE calls with A%=&9E or &9F. These give low level access to speech by directly writing to and reading from the speech processor. This is quite complicated, but gives you the added bonus of producing sounds from parts of words.

OSBYTE call with A%=&EB will indicate if a speech processor is present. X%=&FF if present, X%=&00 if not. If it is present this also turns it off! It can be turned on again with *FX 235,255.

Although obviously limited in its scope WORD PHROM A delivers very good quality English speech, especially for the price. The provisional manual is very comprehensive and easy to use.

Some more useless information about the BBC Microcomputer

THE machine operating system is held in a 16k ROM, which extends from &C000 to &FFFF, but within that address allocation there are three pages (3 x 256 bytes) of memory – &FC00 to &FEFF – which are used for memory-mapped input/output, *writes Paul Beverley.*

Therefore, when any of these addresses is being accessed the operating system ROM is automatically disabled. That means that there is 3/4 k bytes of information in the ROM which is normally inaccessible.

Even though it is inaccessible, there must be something in there – it could be all zeros I suppose, but knowing some of the Acorn engineers it seems unlikely that they would miss the opportunity of putting something in there, even if it was a message like "Stop messing about and put this chip back into the machine it came from. You have voided your warranty!!!"

One way to find out what is really in there would be to borrow an operating system ROM from another machine and put it in one of the sideways ROM sockets. Then, since you cannot run Basic at the same time, you would have to use a machine code monitor program to select the particular ROM slot by changing the contents of &FE30, the sideways ROM paging register. (Numbers 0 to 3 are used for the four slots.)

Now the information you want to look at will be accessible between &BC00 and &BEFF, since the sideways ROMs are mapped between &8000 and &BFFF. You would then have to transfer the bytes across into RAM, switch the sideways ROM register back to Basic and then use Basic to look at the information at leisure.

Some idiot had to do it sooner or later, so I thought it might as well be me! This is what I found . . .

(C) 1981 Acorn Computers. Thanks are due to the following contributors to the development of the BBC Computer (among others too numerous to mention): David Allen, Bob Austin, Ram Banerjee, Paul Bond, Allen Boothroyd, Cambridge, Cleartone, John Coll, John Cox, Andy Cripps, Chris Curry, 6502 designers, Jeremy Dion, Tim Dobson, Joe Dunn, Paul Farrell, Ferranti, Steve Furber, Jon Gibbons, Andrew Gordon, Lawrence Hardwick, Dylan Harris, Hermann Hauser, Hitachi, Andy Hopper, ICL, Martin Jackson, Brian Jones, Chris Jordan, David King, David Kitson, Paul Kriwaczek, Computer Laboratory, Peter Miller, Arthur Norman, Glyn Phillips, Mike Prees, John Radcliffe, Wilberforce Road, Peter Robinson, Richard Russell, Kim Spence-Jones, Graham Tebby, Jon Thackray, Chris Turner, Adrian Warner, Roger Wilson, Alan Wright.

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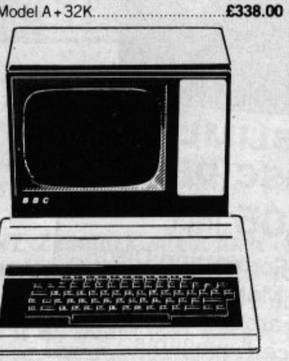

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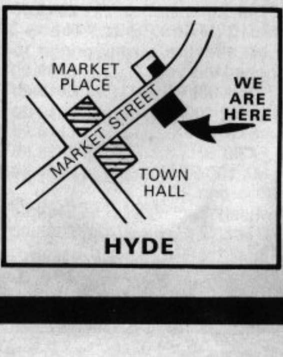

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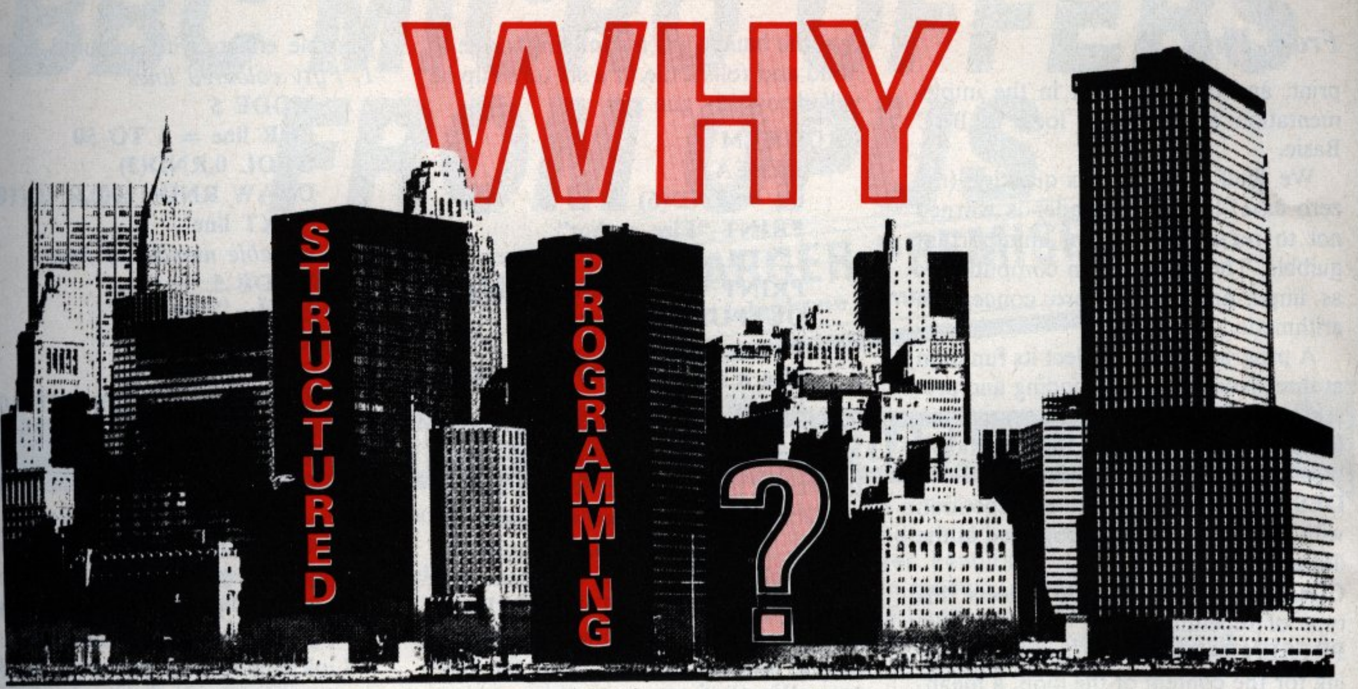

Magnifying effort: Repetition

By ROY ATHERTON

"Mind is the great lever of all things." – Daniel Webster, 1825.

HEINZ Zemanek might have identified the GOTO statement as the source of many computing problems in 1959. There is no doubt that Edsger Dijkstra called the computing fraternity's attention to it very firmly in 1968. By the early 1970s many people were aware of it, though they did not all know that the solution was at hand.

The solutions had already been embodied in both Algol 68 and Pascal, and Borge Christensen of the Tonder Teachers' College, Denmark, and some colleagues asked themselves if they should abandon Basic altogether for teaching and use Pascal.

They decided that the very great virtues of Basic justified its retention and extension. They took control structures from Pascal, simplified them to match the style of Basic, and added them.

The result was called Comal (Common Algorithmic Language). Technically it was an extended Basic, but the new name signified the totally different philosophy of problem solving which it represented.

BBC Basic does not have all the control structures and facilities of Comal, but it has enough to make good programming a realistic possibility for all. These articles will show how this can be done and what to do in those cases where the missing structures might cause trouble.

CONCEPT: Repetition with exit on a count

This can be illustrated by simulating Wyatt Earp, Sheriff of Dodge City, ordering his deputy to test his long-barrelled pistol by firing it six times.

```
DESIGN
  FOR shot = 1 TO 6
  Fire a shot
NEXT shot
```

The concept is expressed in the notation of BBC Basic. It has the essential components shown.

```
OPENING KEYWORD FOR
CONTENT
  Fire a shot
CLOSING KEYWORD NEXT
```

Some further information is also necessary to ensure that the repetition is properly handled.

```
PROGRAM
  FOR shot = 1 TO 6
  PRINT "Fire a shot"
NEXT shot
OUTPUT Fire a shot
       Fire a shot
       Fire a shot
       Fire a shot
       Fire a shot
       Fire a shot
```

The variable *shot,* called the control variable of the FOR loop, can be used within the loop but its value should not be changed by the content of the loop. We could write:

```
PROGRAM
  FOR shot = 1 TO 6
  PRINT "Fire shot number"; shot
NEXT shot
OUTPUT Fire shot number 1
       Fire shot number 2
       Fire shot number 3
       Fire shot number 4
       Fire shot number 5
       Fire shot number 6
```

If the 6 in the FOR statement is changed to zero then, logically, no shots should be fired. In practice, however, the output would be one line of

---

* *Roy Atherton is with Bulmearshe Computer Education Centre.*

From Page 25

print, and this is a fault in the implementation of the FOR loop in BBC Basic.

We shall return to this question (the zero case) later. The reader is warned not to regard this as an unimportant quibble. The zero case in computing is as important as the zero concept in arithmetic.

A program should reflect its function at three levels – design, coding and presentation. Even as small an example as the above demonstrates this, as shown below.

DESIGN The concept of repetition with exit on a count is recognised at the design stage.

CODING The FOR loop reflects this type of repetition.

PRESENTATION The use of indenting for the content of the loop, a meaningful variable name, *shot*, the use of upper case for key words and lower case for the variable name help the reader to understand the program and its function. In much the same way spacing, capital letters, paragraphing, etc., help the reader of ordinary text.

CONCEPT: Repetition with exit on a condition

A bandit is holed up in the old school house. Wyatt Earp instructs the deputy to keep firing shots until the bandit throws out his gun.

```
DESIGN
    REPEAT
    Fire a shot
    UNTIL Bandit throws out gun
```

We can simulate this by supposing that the bandit has a gambling frame of mind and rolls a die. If a six turns up he will throw his gun out.

```
PROGRAM
    REPEAT
    die = RND(6)
    PRINT “Fire a shot”
    UNTIL die = 6
    PRINT “Bandit throws out gun”
    OUTPUT Fire a shot
    Fire a shot
    Fire a shot (number may vary)
    Bandit throws out gun
```

Again we have a problem, or rather the bandit has. If he throws out his gun immediately he still gets one shot fired at him. This is unfair and is another instance of the zero case. This time it is not Acorn's fault. The REPEAT/UNTIL structure is inherently incapable of dealing properly with the zero case. We shall return to this problem again.

We now have two concepts and corresponding program structures for dealing with repetition. Exit must be determined by a count or by a condition. There is no other way (the count is really a special type of condition but we shall keep the distinction).

There is more to be said about recognising and handling repetition, but it should now be apparent that the necessary structures are simple in concept and notation.

The use of random numbers and BBC graphics enables some quite dramatic, highly motivating effects to be achieved with minimal effort. The programs below illustrate some possible effects with coloured lines.

1. Fifty coloured lines

```
    MODE 5
    FOR line = 1 TO 50
    GCOL 0,RND(3)
    DRAW RND(1200),RND(1000)
    NEXT line
```

2. A variable number of lines

```
    MODE 5
    stopper = 99
    REPEAT
    GCOL 0, RND(3)
    DRAW RND(1200),RND(1000)
    UNTIL RND(100) = stopper
```

3. An indefinite number of lines

```
    MODE 5
    cows_come_home = FALSE
    REPEAT
    GCOL 0,RND(3)
    DRAW RND(1200),RND(1000)
    UNTIL cows_come_home
```

Line numbers are not given but they must be inserted when programs are entered.

The REPEAT loop continues UNTIL a condition is TRUE. This will happen eventually in program 2, but program 3 will continue indefinitely. The ESCAPE key will stop it.

The variable, cows-come-home, uses the dash (under the £ sign on the keyboard), not the minus sign.

It is recommended that keywords of BBC Basic are always written in upper case and other words of a program in lower case. This will improve presentation and avoid some annoying problems which might otherwise arise.

Meaningful variable names should be used. Names like X, Y, z, p, a1 are abstract and unhelpful.

Impious thought for the day

AND the Lord said unto Noah: "Where is the ark I have commanded thee to build?"

And Noah said unto the Lord: "Verily, I have three carpenters off ill. The gopher wood supplier hath let me down – yea, even though the gopher wood hath been on order for nigh upon 12 months. What can I do, O Lord?"

And God said unto Noah: "I want that ark finished even after seven days and seven nights."

And Noah said "It will be so."

And it was not so.

And the Lord said: "What seemeth to be the trouble this time?"

And Noah said unto the Lord: "Mine sub-contractors hath gone bankrupt. The pitch which Thou commandest me to put on the outside and on the inside of the ark hath not arrived. The plumber hath gone on strike. Shem, my son, who helpeth me on the ark side of the business, hath formed a pop group. Lord, I am undone."

And the Lord grew angry and said: "And what about the animals, the male and the female of every sort I ordered to come unto thee to keep their seed alive upon the face of the earth?"

And Noah said unto the Lord: "They have been delivered unto the wrong address but should arrve on Friday."

And the Lord said: "How about the Unicorns, and the fowls of the air by sevens and all that equipment from Acorn computers?"

And Noah wrung his hands and wept, saying "Lord, Unicorns are a discontinued line, thou canst not get them for love nor money. And it hath just been told unto me that the fowls of the air are sold only in half-dozens and Acorn sayeth that delivery will be in three weeks. Lord, Lord, Thou knowest how it is."

And the Lord in His wisdom said: "Noah, my son, I knowest. Why else dost thou think I have caused a flood to descend upon the earth?" **Tony Blade**

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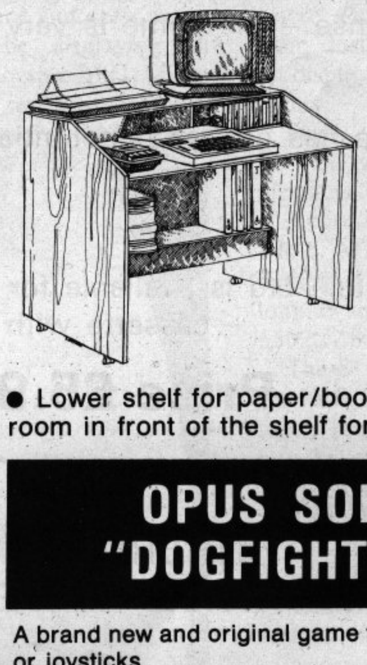

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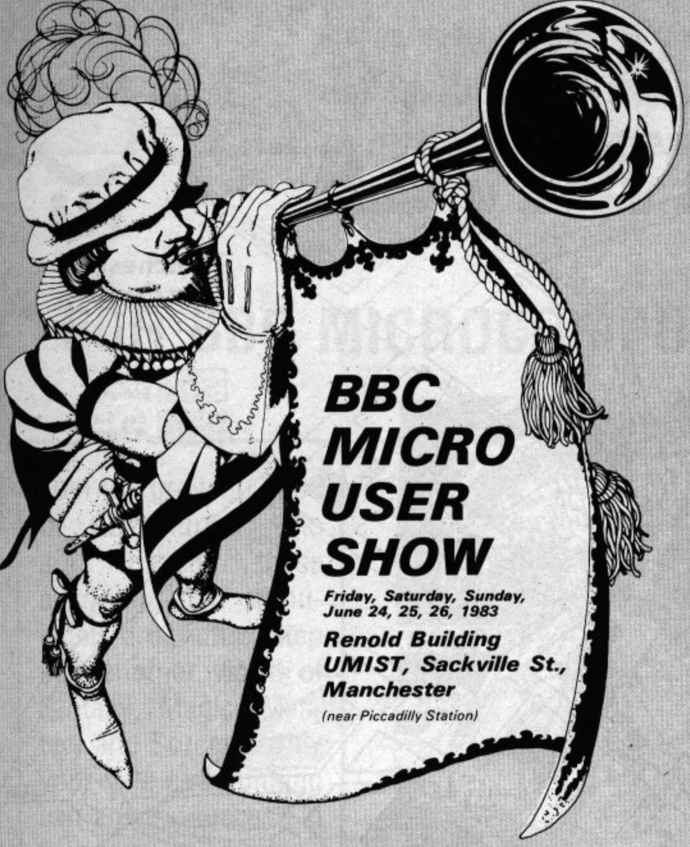

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IT'S all happening at the BBC Micro User Show! Preparations are well advanced for the largest-ever gathering of BBC Micro users under one roof.

Held in UMIST's prestigious Renolds building in Manchester – the city that gave birth to the computer industry – the show is attracting all the major dealers and manufacturers of BBC Micro hardware and software.

Exhibitors will be displaying all things fascinating to the BBC Micro user, and a whole series of activities will be featured that will make the event unique among shows.

Anyone who is anyone in the BBC Micro world will be there. Everything from dust covers to interfaces will be on display – plus all the latest developments.

Many companies are planning to visit the show to release exciting new products.

Acorn Computers will be using the BBC Micro User Show as the launching pad for all three of their long-awaited second processors – the 6502, Z80 and 16032.

These second processors will give the BBC Micro extra memory to enable larger programs to be run, while leaving the original memory free to deal with the screen and other input/output functions.

This will open entirely new fields of application for the BBC Micro, particularly in the area of graphics, education and business.

Acorn will also be giving a preview of their CP/M software package, a sophisticated suite of programs that will be available from mid July.

And there are high hopes of having the Electron there as well!

Torch Computers have chosen the show to spearhead a massive national sales drive. Not only will their Z80 disc pack for the BBC Micro be on display, but also their own computer, big brother to the BBC Micro, which uses the same board.

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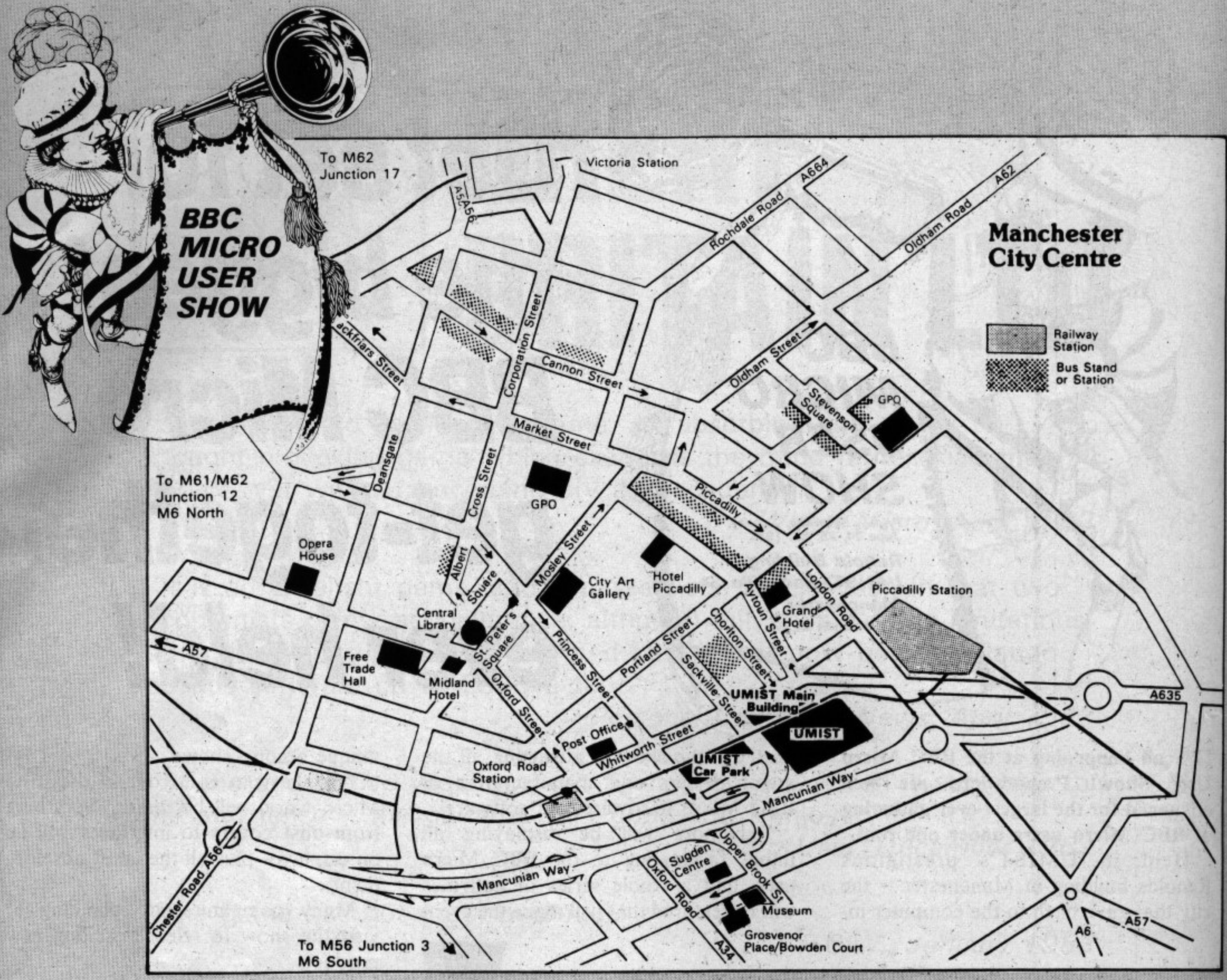
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advanced machine offers is the ability to turn itself into a BBC Micro – and so run all the software written for the BBC machine.

The show will also feature a series of talks on all aspects of the BBC Micro.

Friday is education day, with top names from the field of computer literacy much in evidence. However it's not going to be all theory – we'll have real teachers speaking, most of them contributors to BBC Micro User.

They'll be talking about how they use computers in their own classroom. Whether your field is primary or secondary, music or maths, history or geography, infants or interfacing, you'll find plenty to interest you among the chats.

We'll also be bringing along some of Britain's leading suppliers of educational software, so you can make your own points about the software you require, and the quality of what you are receiving.

All in all, a vital day for anyone using the BBC Micro in education.

On Saturday and Sunday the talks will provide something of interest for every user of the BBC machine. We'll have something for absolute beginners as well as experts.

As part of our graphics coverage, Paul Leman will be demonstrating simple animation techniques that will help bring your programs to life.

Paul Beverley will be showing just how simple machine code really is, and also offering something for the more advanced.

Jim Notman will be giving assistance to those who can't resist poking about in the ROM.

Mike Cook will be displaying his latest ideas for you solder freaks, as well as giving guidance to the newcomer to interfacing. With David Ellis of "Making the Most of the Micro" fame showing us how to exploit the musical potential of the BBC Micro, it promises to be a fascinating couple of days for BBC Micro users.

On each day of the show we'll be offering prizes to those of our visitors clever and determined enough to solve our free competition.

Friday's prize will be a colour monitor, Saturday's a disc drive and Sunday's a printer. As well as this, on Saturday we'll be offering the runner-up a place on UMIST's "Programming in Basic" course. This residential course, normally costing £120, runs from July 17 to 26.

And, of course, there will be plenty of consolation prizes.

On top of all this, there will be the BBC Micro User stand, constantly manned by our contributors. If you want to talk to any of our writers, they're almost certain to be there sometime over the weekend.

You'll have no trouble finding UMIST. Situated in the heart of Manchester, it's easily accessible by road and rail with plenty of parking available.

So there you have it – a fine venue, all the latest products, stimulating sessions on the micro, prizes for the fortunate and the BBC Micro User stand itself.

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● *For further details see Pages 70-71.*

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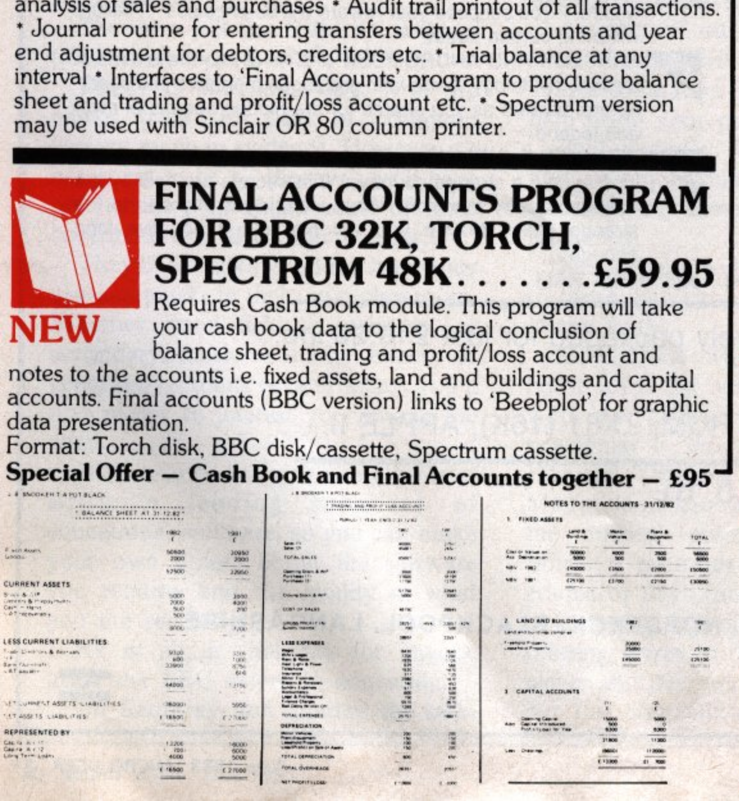

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```
      POSITION    A1    RC          SPACE   5185        T
                  II          A          II    B     II    C     II
  1             -J.B. SNOOKER T/A POT-BLACK
  2             PROJECTED CASH FLOW                YEAR       ENDED
  3
  4                                                 Oct.        Nov.
  5                                                  £           £
  6             INCOME
  7             Sales                              11786       10944
  8                                                _____       _____
  9
 10             REVENUE EXPENDITURE
 11             Purchases                            500         500
 12             Advertising                          500        1000
 13             Director's salary                   1596        1596
 14             Salaries                            2216        2216
 15             Rent
 16             Telephone                                        300
 17             Insurance                                        200
 18             Printing, stationary                             400
 19             Repairs & renewals
 20             Hire of equipment                     60          60
      COMMAND BCDEFGPRSTW'?
```

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Sinclair Spectrum 16k or 48k	●	●	●			●		●	●	●	●
Dragon 32k or 64k	●	●	●	●	●			●	●		
VIC 20 (16k +)	●	●	●	●				●	●		
Sinclair ZX81 (16k +)	●										
Grundy Newbrain	●										
Sharp MZ80A	●	●	●	●				●	●		
Sharp MZ80K	●	●	●	●				●	●		
Sharp MZ80B	●	●	●	●				●	●		
BBC Micro model A or B 32k	●	●	●	●	●	●	●	●	●	●	●
Atari 400/800	●										
Torch	●	●	●	●	●	●	●	●	●	●	●
Epson HX-20	●										
Commodore 64	●										

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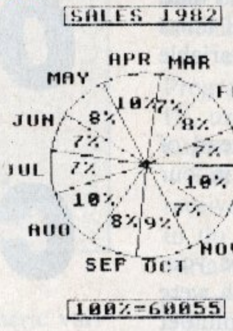

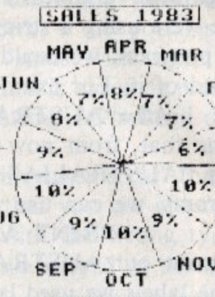

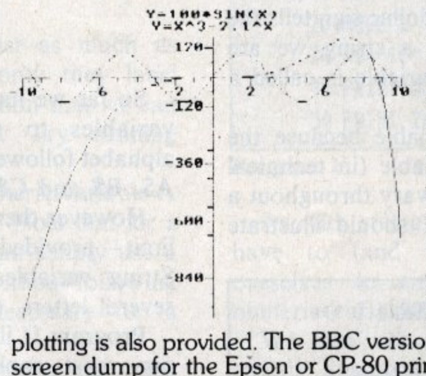

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Part four of MIKE BIBBY'S introduction to programming

Making capital out of lower case letters

WE saw last month how to label strings with variables. This meant that, if we were using a string several times in a program, we could use a variable instead of it. For example

A$="AUSTRALIA"

means that, from now on, instead of using "AUSTRALIA" in full in our programs, we can use A$.

PRINT A$

will print out AUSTRALIA for you.

The labels we used last month were all single letters of the alphabet followed by '$'. The dollar sign tells the computer that it is a string we are labelling – such a variable is called a string variable.

It is called a variable because the "contents" of a variable (in technical terms, its value) can vary throughout a program. Program I should illustrate the point.

```
10 REM *** PROGRAM I ***
20 MODE 6
30 A$="AUSTRALIA"
40 PRINT A$
50 A$="AMERICA"
60 PRINT A$
70 A$="AFRICA"
80 PRINT A$
```

Program I

As you will see when you RUN it, the value of A$ varies as we reassign it during the program. A$ always takes the last value assigned to it.

You may wonder why on earth you would want to use the same variable for different things, rather than label everything separately. As we shall see, it can be extremely useful.

```
 10 REM *** PROGRAM II ***
 20 MODE 6
 30 name$="Mr.Smith"
 40 fact$="You owe me money."
 50 threat$="Pay up or else."
 60 PRINT ''''''
 70 PRINT"Dear "name$
 80 PRINT TAB(5) fact$;threat$
 90 PRINT TAB(15)"cordially yours,"
100 PRINT TAB(20) "Mike"
```

Program II

So far we have restricted our string variables to single letters of the alphabet followed by the $ sign, such as A$, B$ and C$.

However there is no need for such a limit – provided we follow them with $. String variables can be made up of several letters, even words.

Program II illustrates the point. It is our most sophisticated program to date, and is well worth having a close look at.

Perhaps the first thing to remark upon is that we are now working in lower case letters as well as capitals. Infuriating as this is at first for the non-typist (myself included), it really is worthwhile.

Notice that in the programs all the Basic keywords are in capitals – they have to be, or else the BBC Micro doesn't realise that they are meant to be Basic keywords.

All the variables (names$, fact$, threat$) are in lower case. This may not make for easy typing, but it is good programming practice, since you can tell at a glance what's what in a program.

So from now on for a lot of the programs you'd probably fare better with the CAPS LOCK off.

Take a close look at those variable names – we are using actual words for the labels in this program. Again, it is good programming practice to do so, since we can make the label describe what it is labelling. Programs make more sense this way.

Thus we use name$ to label "Mr. Smith", fact$ to label "You owe me money", and threat$ for "Pay up or else".

This may seem long-winded, but it really does help to make your programs more readable, and hence easier to decipher. For example:

70 PRINT "Dear "name$

really tells you what the line is doing, far more than

70 PRINT "Dear "A$

Similarly

PRINT threat$

is more meaningful than

PRINT B$

The moral is, use words for variables (labels) as much as possible – and preferably lower case words.

Actually you can use capitals for variable names and intermix them with lower case letters and also numbers. The rules for doing so are as follows:

- All variable names must begin with a letter, though you can follow this with any mixture of letters and numbers. Letters may be upper or lower case.
- You cannot put spaces in the middle of variable names. Sometimes, though, it makes sense to use two words as a label. In this case join them with the underline character. For example, upper_limit, final_weight.
- Variables should not start with Basic keywords such as TO or COLOUR, so TOP_WEIGHT would be illegal.

The commonest error is to start a variable with a keyword. Some days they seem to crop up in every variable name you think of! If you make all your variables lower case that won't happen.

One advantage of using variables instead of directly using strings is that we can easily alter the output of the program.

In the case of Program II, if we want another victim to be the recipient of our letter, just change line 30. For example,

30 name$="Mr. Jones"

From then on all uses of name$ in the program will refer to Mr. Jones.

In this short program it doesn't make a great deal of difference, but in larger ones, if you had used the string "Mr. Smith" every time, instead of name$, you would be in for a lot of retyping.

Program II introduces another new idea, the use of the TAB( ) function. This allows you to specify how far along a line you want the output of a PRINT statement to start.

In Mode 6 there are 40 characters to a line, so the screen can be considered to be 40 columns wide. TAB( ) decides in which column the print out starts. However, the 40 columns are numbered 0 to 39, so, although it uses TAB(5), line 80 actually prints in the sixth column.

When you change mode the number of characters across the screen, that is the number of columns, changes. For example, Mode 5 only supports 20 characters. Try running the program in this mode by changing line 20 to

20 MODE 5

Can you see what is happening?

After a while TAB( ) becomes second nature. All too often potentially good programs are spoiled because they are set out badly on the screen. Careful use of TAB( ) can avoid this.

To give you some practice, try Program III. This prints out a triangle of asterisks. Can you devise a similar program, using TAB( ), to create a diamond of asterisks in the centre of the screen?

Before you continue, you might find it easier on the eyes if you return to Mode 6 with:

MODE 6 [Return]

So far we have talked about string variables. However there is another kind of variable called a numeric variable.

```
10 REM *** PROGRAM III ***
20 MODE 5
30 PRINT '''''
40 PRINT TAB(4)"*"
50 PRINT TAB(3)"***"
60 PRINT TAB(2)"*****"
70 PRINT TAB(1)"*******"
80 PRINT TAB(0)"*********"
```

Program III

These are labels just as much as string variables are, only they label numbers in such a fashion that we can do sums with them. Try running Program IV.

Line 30 uses the numeric variable A to label the number 10. Note that for a numeric variable we can simply use a letter of the alphabet without following it with the $ sign necessary for a string.

Also since it isn't a string, the value we are giving the variable doesn't have to be in quotes. Hence line 30 is simply

30 A=10

Line 40 prints out, not A, of course, but the value that A labels, which is 10.

The most interesting part is line 50. Here we multiply the number that A labels by two, so that the line prints out 20.

That's the useful thing about numeric variables – you can do sums with them!

Try running Program IV with the following versions of line 50:

50 PRINT A+8
50 PRINT A/4
50 PRINT A*A

If you've been following what I've said so far, you could be forgiven for thinking that string variables are for labelling words, and numeric variables for numbers.

```
10 REM *** PROGRAM IV ***
20 MODE 6
30 A=10
40 PRINT A
50 PRINT 2*A
```

Program IV

Life is never that simple. You can, and often do, use string variables for labelling numbers – the point is that you can't do sums with them. Try Program V, which is based on program IV, using the string A$ instead of the numeric A.

The "Type mismatch error" that you receive shows that you are attempting to do a sum with the wrong type of variable – string instead of numeric.

```
10 REM *** PROGRAM V ***
20 MODE 6
30 A$="10"
40 PRINT A$
50 PRINT 2*A$
```

Program V

As with string variables, we do not have to (and should not) restrict ourselves to single-letter labels for numeric variables.

We can use words in a manner strictly analogous to string variables, save that we omit the final $ sign. And, of course, we don't put what we are labelling in quotes, since it isn't a string.

Have a look at Program VI. This is meant to be a cheery greeting for someone when they RUN the program in the computer – the sort of thing I often use in my classes.

```
10 REM *** PROGRAM VI ***
20 MODE 6
30 name$="MIKE"
40 PRINT "GOOD TO SEE YOU, " name$
```

Program VI

However as it stands it's a bit restricted – after all, only a small percentage of my students are called MIKE. What's really needed is some way for the BBC Micro to find out the name of the person so that it can tailor the messaage to suit.

Program VII fits the bill. The trick here is the use of INPUT name$ in line 40. In Program VI, line 30 put the value MIKE into name$. In Program VII the variable isn't actually attached

→

From Page 35

to a specific value – if you like, you give the program a label, but neglect to tell it what it's labelling. Instead you type:

40 INPUT name$

When the BBC Micro reaches this line it waits until you PUT IN, or INPUT, the value you want name$ to have by typing the value in.

To put it another way, when the computer meets an INPUT statement followed by a variable, it asks you what you want the variable to be – in fact, it actually puts a question mark on the screen.

You are then supposed to type in the answer followed by Return, which, as always, sends it to the computer, which then carries on with the rest of the program.

```
10 REM *** PROGRAM VII ***
20 MODE 6
30 PRINT "WHAT IS YOUR NAME";
40 INPUT name$
50 PRINT '' "GOOD TO SEE YOU " name
$
```

Program VII

So when you run the above program line 30 asks "WHAT IS YOUR NAME". Notice that we don't need a question mark – the INPUT statement of line 40 supplies that.

The micro then waits for us to type our reply and send it by pressing Return. Whatever we have typed in then becomes the value of name$ – even if we have lied!

Line 50 then prints out the message.

The point of all this is that in Program VII, as opposed to Program VI, the value of name$ is not fixed initially, but is decided during the program by the response to INPUT.

This means that every student in the class can now run the program and have the message tailored to themselves.

Incidentally, line 30 is not strictly necessary, but it is only polite to tell people what kind of response you expect them to make. Otherwise they will be met with just a question mark, followed by a flashing cursor – not too "user-friendly" as the jargon has it.

The semi-colon at the end of line 30 "glues" the question mark, or prompt, as it is known, to the preceeding "message". Running the program with it omitted should make this clear.

Remember, when you run Program VII and it asks for your name, you must type your reply then press Return. If you omit Return the BBC Micro won't receive your answer and will continue waiting. This could be incredibly boring!

If you make a typing mistake before you press Return, you can erase it with Delete. Once you've pressed Return, though, you're stuck with what you've typed.

You can use INPUT with numeric variables as well as strings. Program VIII demonstrates this. When you get the prompt, try typing in a word rather than a number and see what happens.

```
10 REM *** PROGRAM VIII ***
20 MODE 6
30 PRINT "How old are you";
40 INPUT age
50 PRINT '' "I don't believe you ar
e "; age
```

Program VIII

A slightly more serious application of INPUT allows you to calculate the product of two numbers, as Program IX demonstrates.

```
10 REM *** PROGRAM IX ***
20 MODE 6
30 PRINT "First Number";
40 INPUT first
50 PRINT "Second Number";
60 INPUT second
70 PRINT; first " multiplied by ";s
econd " is "; first * second
```

Program IX

Look carefully at line 70 and see if you can work out what's happening. *first* isn't in quotes, and so the Micro will print the number that *first* labels. "Multiplied by" is printed literally since it is in quotes.

The numeric variable *second* is not in quotes – it may have them on either side, but the quotes on the left are already paired with the quotes on the far left, so they don't count. The Micro will, therefore, print out the value of *second*.

"Is" is printed literally, since it is in quotes. *First*second* isn't in quotes, so the sum is done and the answer printed out. Figure I should help to make this clearer.

Finally, try altering program IX so that it adds or subtracts pairs of numbers.

We've covered an enormous amount of ground this month. I suggest that you spend a good while going over the programs. If you are having problems, re-reading the earlier articles in the series will probably help.

Above all, remember it's a "hands-on" course – you can't expect the examples to make sense until you've typed them in!

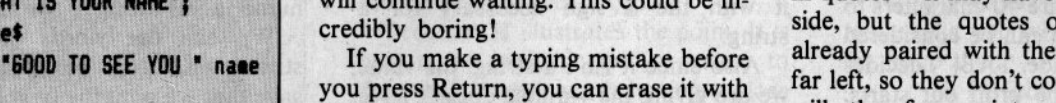

Figure I

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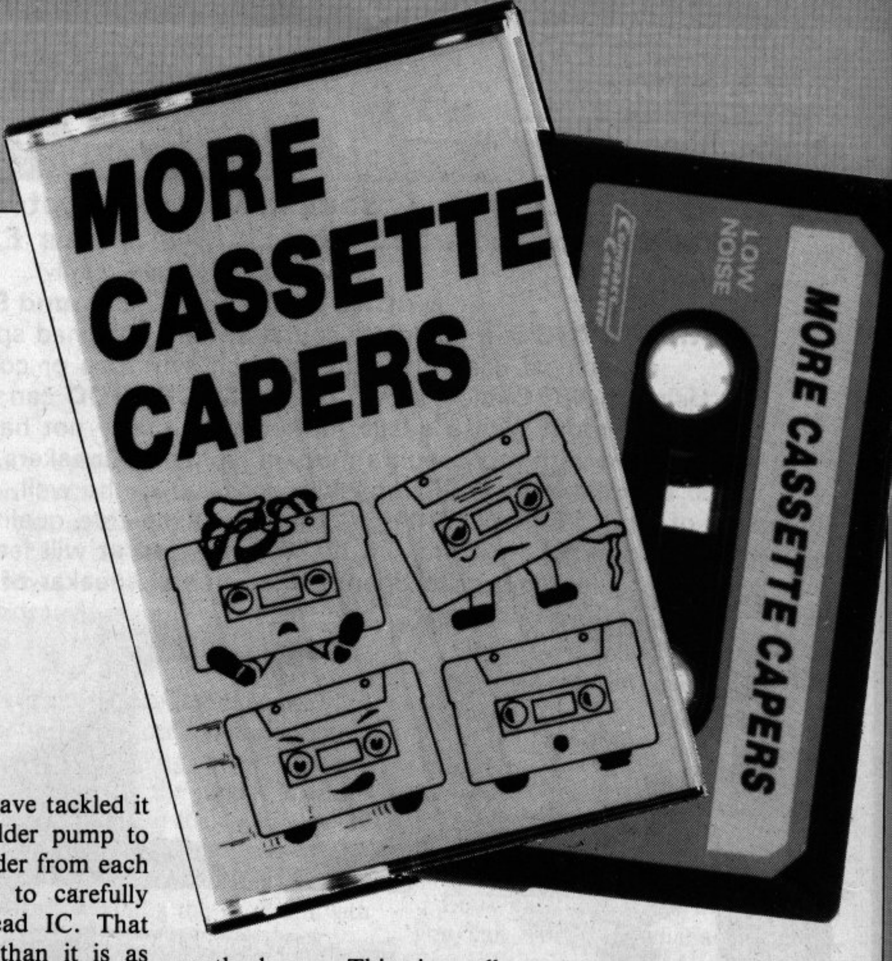

IN the March issue of *BBC Micro User* MIKE COOK explained about the cassette problems he had so far encountered. Since then he has come across several others. Here they are . . .

- **When the command to load in a program is given, the computer indicates it is searching but never finds anything.**

Assuming all the leads are OK and there IS a program on the tape, it looks as if you have blown up the input chip in the computer.

This is IC 35 and is located just next to the cassette input socket. It consists of four operational amplifiers (op-amps to the initiated) and conditions the cassette signal before it goes to the serial ULA. The voltage supply to this chip is ± 5 volts and the chip will suffer damage if the signal you feed into it from your cassette recorder is greater than this.

Quite a few recorders are capable of producing more than 10 volts, peak to peak, when operating into a high impedence input (like the cassette input) at full volume.

You can test to see whether the chip is damaged by looking at the input – pin No. 10 – to see if a signal is reaching it. If so then pin No. 1 should have a 5 volt square wave on it. It if has not then your input chip has bought it!

New ones are readily available. The type number is LM324 and should cost about £2.

However you first have to get the old one out. This is a job that is best left to a dealer unless you have the right tools.

The way I have tackled it is to use a solder pump to remove the solder from each hole and then to carefully remove the dead IC. That sounds easier than it is as there is a considerable knack to removing all the solder.

Whether you do it yourself or get a dealer to replace it, you should solder back a socket in its place. That will ensure that the chip will never go again! Once it is fixed, mark a place on the cassette volume control that is adequate and do not exceed that setting.

You can often be tempted to put in more volume when trying to load a tape recorded on someone else's recorder, but the problem will be that of head alignment as explained in my first article in the March issue.

- **When I try to load in long programs the computer starts to misbehave.**

This is a symptom I have come across on "Realistic" recorders but it might happen on some others with separate mike, remote and output connectors.

Try loading in the program that gives you trouble with only the output connected. That is, disconnect the remote and mike leads.

If it now loads, your problem is almost certainly earth loops. This is well known by the hi-fi fraternity and can produce hum or mains pickup on the signals.

The simple cure is to have only one lead connected at any one time, but you are liable to forget to swap them over and not actually record that program before you switch the computer off!

As a permanent fix, try disconnecting the earth lead from the output socket so that only the centre conductor is connected. You will then need to have all the leads connected for the right connection to be made.

If that doesn't work, reconnect it and remove the earth lead from the mike connector. If you still have no joy, you will just have to improve your memory!

- **A horrible buzzing noise is recorded on the tape.**

This can be caused by certain colour televisions radiating signals that are picked up by the leads. Try to ensure that the cassette leads are placed as far away from the set as possible.

- **The recorder keeps chewing up the tapes.**

The solution is to chew up your recorder and get a decent quality one. And, while you are about it, get some decent tapes.

And a final note: Always remember to save at least two copies of each program as it is extremely unlikely that the same block will come to grief on all copies. I always record a program three times – this ensures I only ever need the first one!

Also if you do want to swap programs between different recorders use the slower, 300 baud speed, which is obtained by using the command *TAPE3.

It is more reliable and tolerant because it is slower, and it is better to wait longer than not be able to load the program at all. Remember you can always re-record it at the faster speed when you have it in the computer.

That's all for now, but if I do come across anything else going wrong with the cassette system I will let you know. Happy LOADing.

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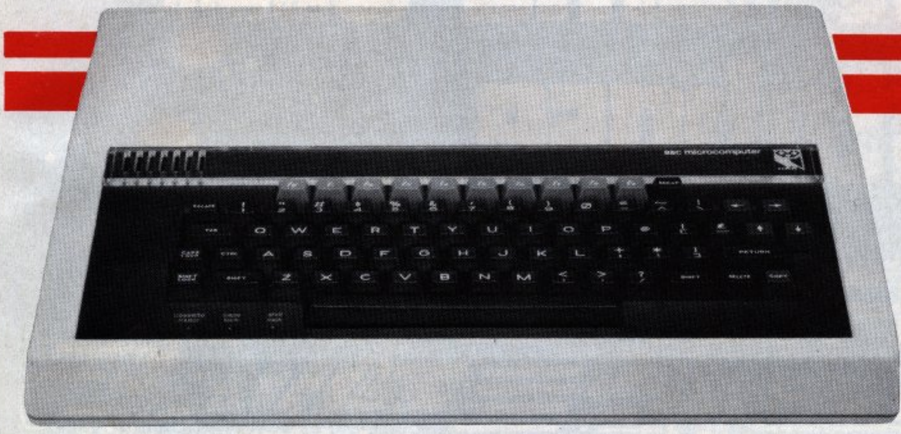

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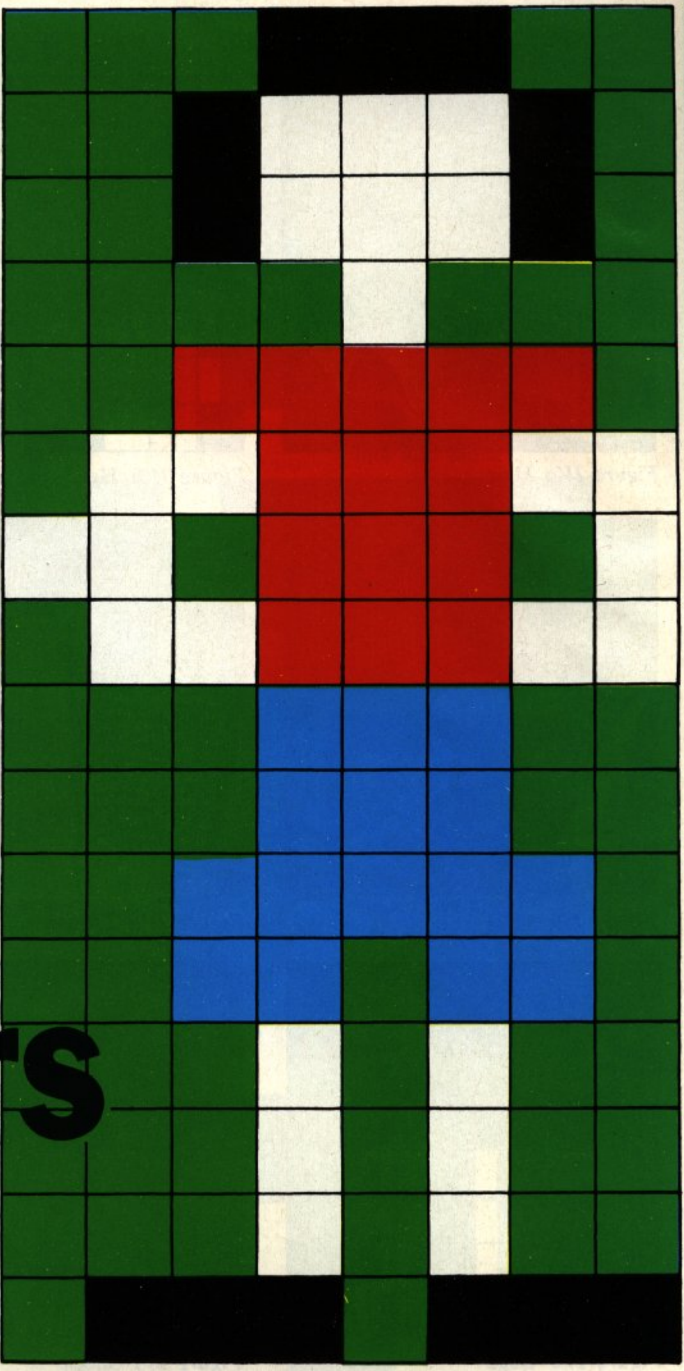
Colour keeps those characters capering



By KIM WEST and PAUL PASSANT

PROBABLY the first user defined character you came across was the BBC "Micronaught" *(see Figure I)* who can be found on page 170 of the User Guide. He was created using the VDU23 command to redefine character 240. Those unfamiliar with this command can find a detailed explaination on page 384 of the User Guide.

Listing I is a simple program which defines "Micronaught" (line 20) and prints him on the screen (line 50). An alternative to line 50 would be:

50 VDU240

This is the exact equivalent.

Boring, we hear you say. Well, bigger and more recognisable figures can be made by defining two or more characters and printing them below each other. *See Listing II.*

Lines 20 and 30 define the

→

```
10 MODE5
20 VDU23,240,28,28,8,127,8,20,34,65
30 FOR I=0 TO 19
40 COLOUR I MOD3+1
50 PRINT;TAB(I);CHR$(240)
60 NEXT
70 END
```

Listing I

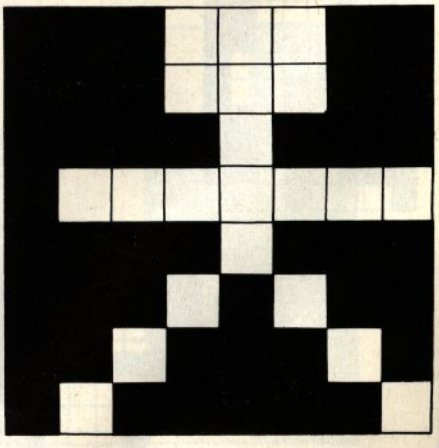


Figure I

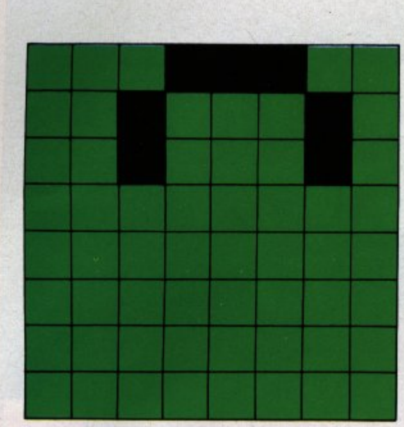


Figure IVa Hair

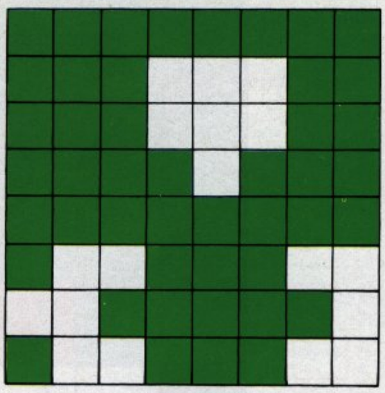


Figure IVb Head and arms

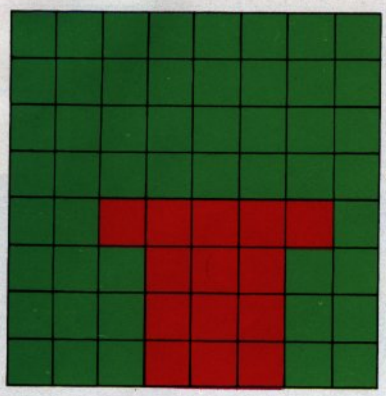


Figure IVc Shirt

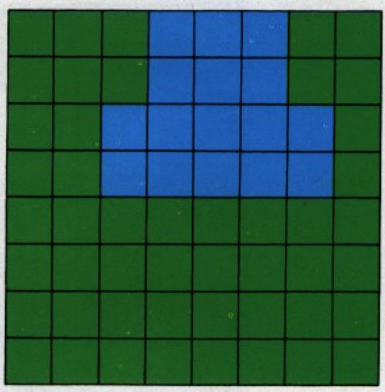


Figure IVd Trousers

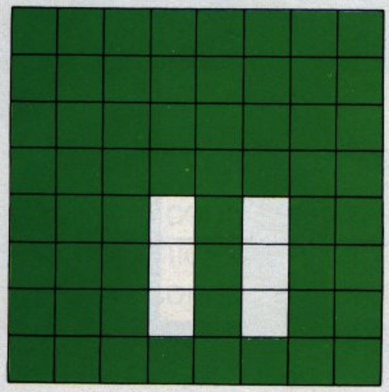


Figure IVe Legs

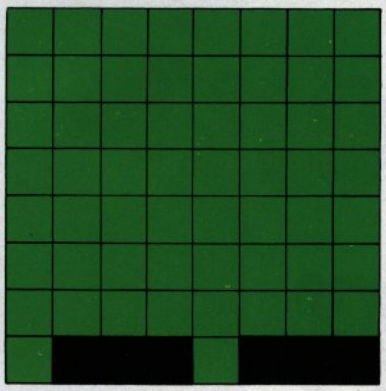
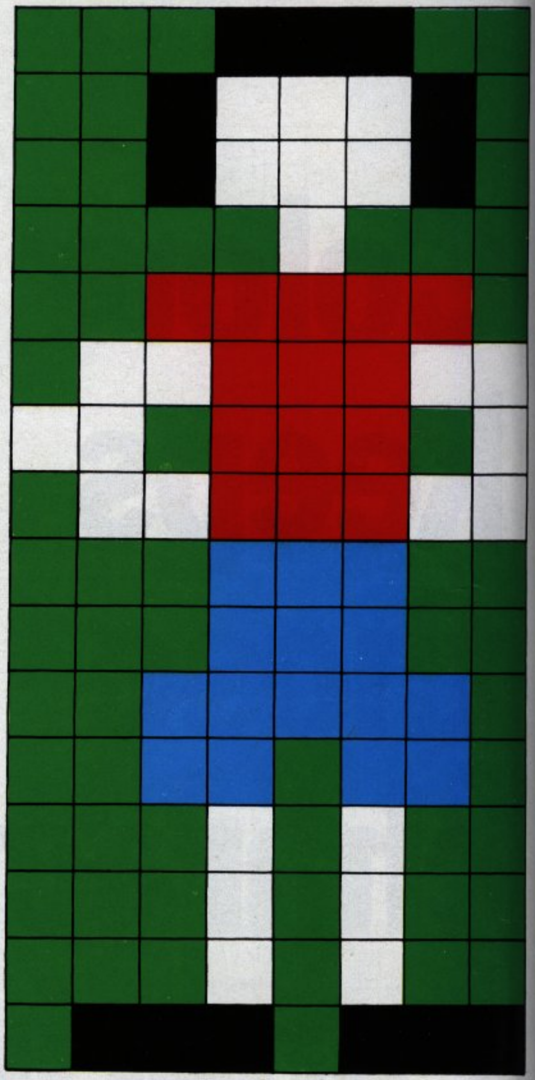


Figure IVf Shoes

The making of Colourful Colin



From Page 41

characters seen in Figures IIa and IIb. Line 50 prints character 224, while lines 60 and 70 move the cursor back one space and down one space respectively.

Line 80 then prints character 225. Lines 50 to 80 can be combined to form a single line:

50 VDU224:VDU8:VDU10:VDU225

This in turn can be simplified to:

50 VDU224,8,10,225

because successive VDUs can be replaced by commas, greatly saving both memory and time.

All very well, but with only two colours, foreground and background, the figure looks rather dull. Can

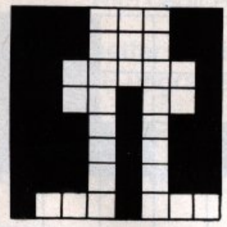


Figure IIa

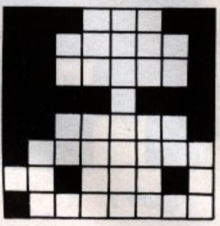


Figure IIb

```
10 MODE2
20 VDU23,224,28,62,62,8,62,127,221,
   127
30 VDU23,225,28,28,62,54,20,20,20,1
   19
40 COLOUR1
45 FOR I=0 TO 19
50 VDU224
60 VDU8
70 VDU10
80 VDU225
85 NEXT
90 END
```

Listing II

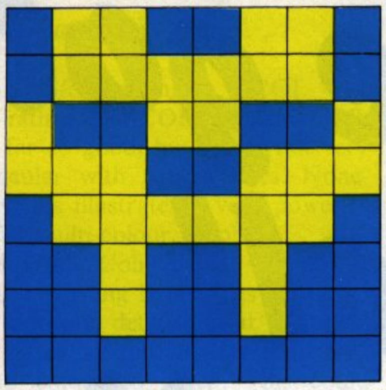


Figure Va Body

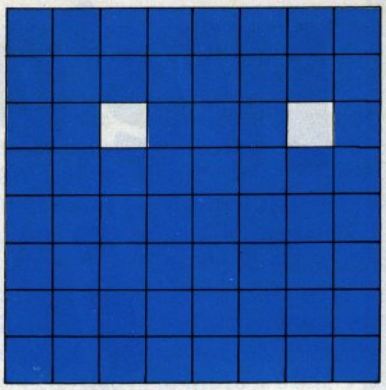


Figure Vb Eyes flashing black and white

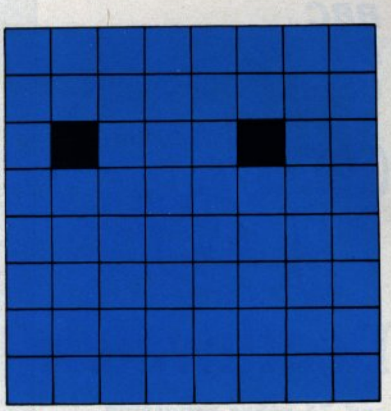


Figure Vc Eyes flashing white and black

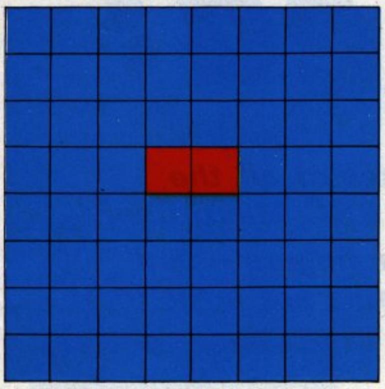


Figure Vd Mouth

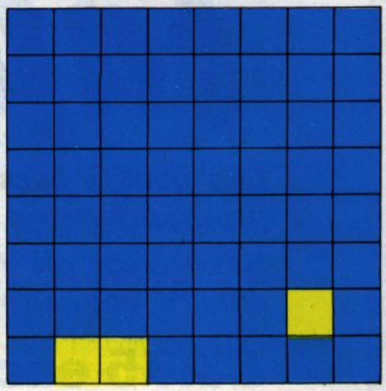


Figure Ve Feet flashing yellow and blue

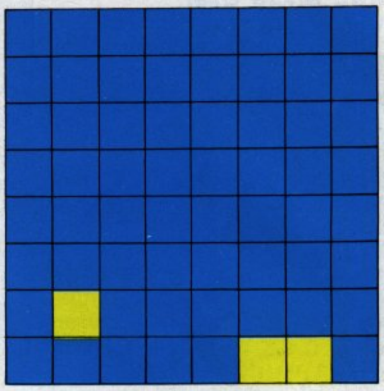


Figure Vf Feet flashing blue and yellow

characters of different colours be superimposed? Try typing in Listing III before moving on.

It would appear that we cannot superimpose characters without the lower one being erased. Fortunately the BBC can overcome this by using the VDU5 command. This tells the computer to print at the graphics cursor.

Two very important features of this are firstly that any figure must be MOVEd to a position on the screen rather than TABbed and secondly, the characters do not overprint all of the block, but only that part which is defined within the character.

So instead of lines 40 and 50 of Listing III try:

```
40 VDU5:MOVE500,500
50 GCOL0,1:VDU240
60 GCOL0,2:VDU8,241
70 END
```

Note that now all commands refer to

```
10 MODE2
20 VDU23,240,255,255,255,255,255,25
   5,255,255
30 VDU23,241,0,0,60,60,60,60,0,0
40 COLOUR1:VDU240
50 COLOUR2:VDU8,241
60 END
```

Listing III

Take six sections and the answer's Mr Lemon

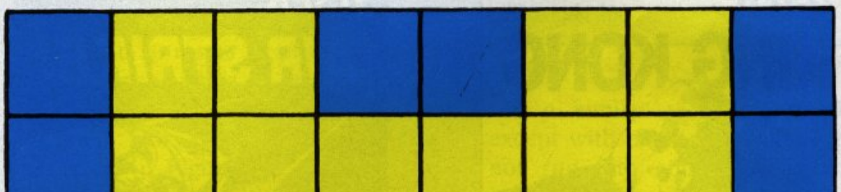
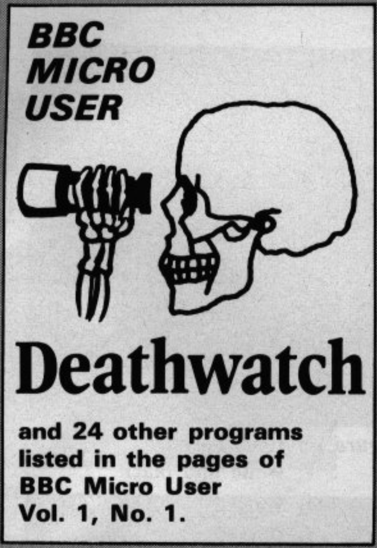


Figure Vg Mr. Lemon



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KING KONG, a fast moving game in which you pilot a helicopter to rescue girls perched on the Empire State Building before killing Kong; **GRAPHICS,** a suite of colourful demonstration programs; **NIM,** a structural game of strategy; **TOKENS,** first steps in unravelling the Basic ROM; **HOROSCOPES,** a fun program with useful error-trapping routines; **FORMATTER,** an essential disc utility; **DISASSEM,** a full machine code disassembler; **HEAT & LIGHT,** two measuring and plotting programs.

May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM;** 25 **ANAGRAMS** for you to solve; **CHARACTER,** to generate vertical and inverted text; **TELETEXT,** animation in Mode 7, really brings the screen to life; **LAB,** a trio of programs to interface laboratory equipment; 10 programs to investigate the **OSBYTE** routine; **BEEB,** two joystick exercises; plus more **COLOUR** and **GRAPHICS** routines.

June Issue

SPACE PILOT, lost in space with dwindling fuel supplies, you must fight off repeated attacks from alien life forms. To replenish fuel, you have to perform a tricky docking manoeuvre, while to repair the inevitable damage you must land on a mountanous planet. **NOMISM,** you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. Can you survive drought, tsetse fly and other hazards? **PLUS** other listings from the June issue.

From Page 43

graphics, for example, GCOL and GLG rather than COLOUR and CLS.

So far so good, but this is not very spectacular with two squares. Nonetheless this illustrates a very powerful tool for multi-colour graphics.

Colourful Colin uses techniques similar to Listing II but uses VDU5 to form a more detailed and colourful man. Lines 50 and 60 set the background colour to green. This could have been done equally well by:

50 COLOUR130
60 CLS

but GCOL0 was used to give the program consistency. In lines 70 to 90 a FOR NEXT loop is used to print Colin a random number of times (up to 21).

Once set, the random number in line 70 remains unchanged until the program is run again.

Line 100 changes the foreground colour to green so the cursor will not be seen when the program ends.

```
 10 REM--COLOURFUL--
 20 REM----COLIN----
 30 MODE2
 40 VDU5:REM********
 50 GCOL0,130
 60 CLG
 70 FOR Z%=0 TO RND(20)
 80 PROCMAN
 90 NEXT Z%
100 GCOL0,2
110 END
200 DEF PROCMAN
210 REM---DEFINE CHARACTERS---
220 VDU23,240,28,34,34,0,0,0,0,0
230 VDU23,241,0,28,28,8,0,99,193,99
240 VDU23,242,0,0,0,0,62,28,28,28
250 VDU23,243,28,28,62,54,0,0,0,0
260 VDU23,244,0,0,0,0,20,20,20,0
270 VDU23,245,0,0,0,0,0,0,0,119
280 REM----PRINT MAN AT----
290 REM--RANDOM POSITION---
300 X%=RND(1248):Y%=RND(992)
310 MOVEX%,Y%
320 GCOL0,0
330 VDU240
340 GCOL0,7
350 VDU8,241
360 GCOL0,1
370 VDU8,242
380 GCOL0,4
390 VDU8,10,243
400 GCOL0,7
410 VDU8,244
420 GCOL0,0
430 VDU8,245
440 ENDPROC
```

Listing IV

PROCMAN (lines 200 to 440) first defines the various characters to be used, Figures IVa to IVf respectively. 300 sets the co-ordinates of the man. These must be within 1280 and 1024 so he is not printed off screen.

From line 320 the colours of the various characters are set with GCOL0 since we are printing at the graphics cursor, and each character printed relative to the first using VDU8 and VDU10 or VDU8,10.

This part of the program is rather long-winded, but fortunately there is a VDU equivalent to GCOL. This is VDU18. Thus GCOL0,1 becomes VDU18,0,1 and so this can be strung together with other VDU commands, as will be seen in the next listing.

Great! But wait, if the flashing colours are employed to animate the figure we could have an impressive man ready for a game. This can be seen in Listing V.

Mr. Lemon looks from side to side, running on the spot, ready for you to put him into a loop which will move him about.

VDU18 can also be applied to background colours as in line 30. Line 40 is the VDU equivalent to CLG.

Lines 70 to 90 should be familiar from Colourful Colin, but line 100 illustrates yet another useful VDU command. VDU4 is the opposite of VDU5 and so resets all printing to the text cursor, which is at the top left of the screen, not having been moved.

Lines 140 to 190 define the characters in Figures Va to Vf.

Lines 230 to 280 use VDUs discussed in previous listings. These could be done all in one line, but this would greatly reduce the readability of the program.

When this program is run Mr. Lemon continues to move even after the program has ended! This useful effect is made by letting characters 228 and 229 (Figures Ve and Vf) flash in and out of the background colour. Two flashing colours are used for the feet – blue and yellow, and yellow and blue. This means that the feet on one character will show when the others are blue.

Unfortunately there is one drawback with this technique. Flashing colours use one colour and its inverse, so unless you are prepared to let Mr. Lemon have shoes of a different colour to yellow, he must have a blue background.

The eyes are not a problem. They use a similar technique to the feet except with black and white, which do not run into complications with the background colour.

```
 10 REM----MR.LEMON----
 20 MODE2
 30 VDU18,0,132
 40 VDU16
 50 REM---DEFINE MAN---
 60 PROCDEFINE
 70 REM-PRINT AT GRAPHICS--
 80 REM------ CURSOR ------
 90 VDU5
100 MOVE500,500
110 PROCPRINT
120 VDU 4
130 END
140 REM---------------
150 DEFPROCDEFINE
160 VDU23,224,102,126,153,231,126,36
    ,36,0
170 VDU23,225,0,0,34,0,0,0,0,0
180 VDU23,226,0,0,68,0,0,0,0,0
190 VDU23,227,0,0,0,24,0,0,0,0
200 VDU23,228,0,0,0,0,0,0,2,96
210 VDU23,229,0,0,0,0,0,0,64,6
220 ENDPROC
230 REM---------------
240 DEFPROCPRINT
250 VDU5:MOVE500,500
260 VDU18,0,3,224,8
270 VDU18,0,8,225,8
280 VDU18,0,15,226,8
290 VDU18,0,1,227,8
300 VDU18,0,11,228,8
310 VDU18,0,12,229
320 ENDPROC
```

Listing V

In terms of simple graphics this is about the limit, but one other command can come in very useful.

In long Basic programs character movement becomes very slow. By increasing the flash rate Mr. Lemon will appear to move faster.

*FX9 and *FX10 control the duration of the first and second colour in the flasher respectively. Initially these are set to 25 fiftieths of a second each. Try 75 *FX9,10:*FX10,10. Rapid!

To summarise, when you require detailed characters to be printed you must:

- Print at the graphics cursor: VDU5
- Change colours by using GCOL
- Use VDU commands whenever possible

Finally, remember flashing colours and *FX commands can combine to give realistic figures with some degree of animation.

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THIS month we present several useful ideas from the pens of John Lord and Paul Leman.

John has provided us with a neat explanation of the string indirection operator, a source of much confusion. We nearly didn't publish this, since some of you out there might be tempted to poke about in areas forbidden by Acorn. On reflection, we decided that you were more mature . . .

John not only explains the operators, he's applied the knowledge and written a single line memory examiner routine. It is small enough to fit into a function key – useful when you're digging around in the ROM.

He probably used the program to ferret out the zero page addresses. They should be correct for OS 1.2 but might differ for others. We would be glad to hear from you if you discover any other useful addresses.

Paul Leman has been looking at the hidden *FX calls in OS 1.2 – no mean feat! He has come up with lots of routines that should prove immensely useful for those of us wishing to boldly go where no Basic programmer has gone before.

Exposed – those missing effects

BY PAUL LEMAN

THE new operating system ROM enables the user to access all of the *FX or OSBYTE calls documented in the User Guide. There are, however, many that are not documented. The range of valid values are:

0 to 22
116 to 159
166 to 255

You will find below explanations of some of the undocumented values.

Some are read only and can be used from Basic by means of the USR statement (see page 445 of the User Guide).

For ease of presentation I have listed all the effects as *FXs, even though some can only be used via USR or in machine code.

***FX 142,X** Enters the Xth, sideways ROM. The slot on the extreme right is slot 3. There is apparently provision in the operating system to access 16.

***FX196** On return the X register contains the auto-repeat delay as set by *FX 11,X.

***FX 197** On return the X register contains the auto-repeat period as set by *FX 12,X.

***FX 200,X** If X=2 then pressing BREAK will have a nasty effect on a program currently in memory. Try it and see! I've been told that X=1 will make the ESCAPE key have the same effect, but it doesn't work with my operating system.

***FX 202,X** X = 16 SHIFT LOCK active.
X = 32 CAPS LOCK active.
X = 48 NEITHER active.
X = 64 BOTH active.

***FX 210,X** X = 1 turns sound on.
X = 0 turns sound off.

***FX 211,X** X gives the sound channel. Try *FX 211,0 then CTRL G.

***FX 213,X** X gives the pitch of the 'beep'.

***FX 214,X** X gives the duration of the 'beep'.

***FX 219,X** Redefines the TAB key to give the Ascii character X. However, try *FX 219,65, then press 'A' and you'll get 'a'. *FX 219,97 gives you 'A'.

***FX 220,X** This allows you to read or set the Ascii key that gives ESCAPE. *FX 220,0 disables the keyboard ESCAPE.

***FX 236** On return the X register contains the destination for output as set by *FX 3,X.

***FX 237** On return the X register contains the cursor edit key state as set by *FX 4,X.

***FX 245** On return the X register contains the output destination as set by *FX 5,X.

***FX 246** On return the X register contains the printer-ignore character as set by *FX 6,X.

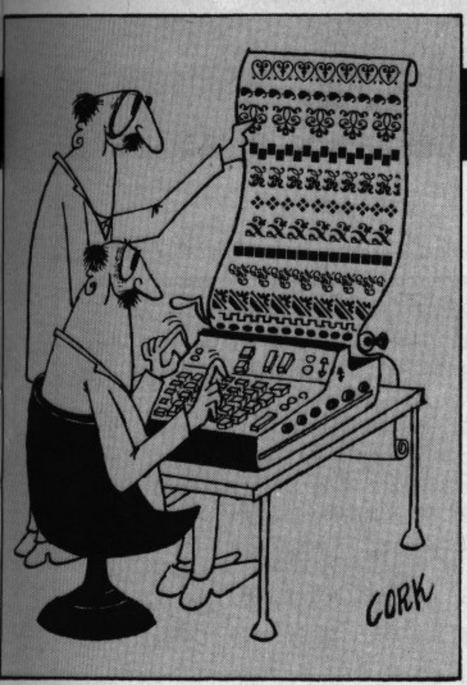
***FX 247,X**
***FX 248,X**
***FX 249,X** On startup locations &247 – &249 normally contain zeroes. On BREAK these locations are looked at and are usually ignored. If these locations contain a three byte instruction, say JMP &2000, then on BREAK the OS will 'jump' to location &2000.

This would be achieved by:

```
*FX 247,76
*FX 248,0
*FX 249,32
```

***FX 252,X** X sets the number of the sideways ROM to be entered after a BREAK.

***FX 253** On return the X register



contains the type of reset that last occurred.

X = 0 BREAK
X = 1 power on
X = 2 CTRL BREAK

***FX 254,X** X = 64 followed by CTRL BREAK will give you the message 'BBC Computer 16K'. *FX 254,128 followed by CTRL BREAK returns you to a 32k machine.

***FX 255,X** The eight bits of X correspond to the links on the bottom right-hand side of the keyboard pcb. The 3 low bits control the screen mode on BREAK. Bit 3 determines whether auto-boot from disc is via BREAK or SHIFT BREAK. Bits 4 and 5 allow selection of various disc drive types and bits 6 and 7 are unused at present. For example, X = 8, bit 3 is on, the rest are off. BREAK will put you into Mode 0, SHIFT BREAK will attempt to boot from the disc in mode 0.

X = 3, bits 1 and 2 are on, the rest are off. BREAK will attempt to boot from the disc in Mode 3, SHIFT BREAK will put you into Mode 3.

String along the dollar operator

By J.F. LORD

THE string indirection operator, or dollar operator $M, enables up to 254 bytes of text to be read or written. The string read starts from location M and extends until a carriage return (&OD) is encountered. If no (&OD) code is present then a "string too long" error is printed because the (&OD) indicates the end of the string.

$M must not be confused with the more usual string variable M$.

Type:

```
M=&DOO [Return]
$M="ABRACADABRA" [Return]
```

and $M will write the string "ABRACADABRA" and a carriage return in memory locations from &ODOO to &ODOB.

As well as writing a string, the operator can read a string starting at M which is terminated with a carriage return. If you now type:

```
PRINT $M [Return]
```

then "ABRACADABRA" will be printed because M is still assumed to be &ODOO.

You can assign $M to be any other string as you would any other variable:

```
A$=$M [Return]
```

If you now type:

```
PRINT A$ [Return]
```

"ABRACADABRA" will once more be printed.

Moving strings from one part of memory to another is performed in four simple steps:

(1) Set M to the start of the string's current address.
(2) Assign $M to A$
(3) Set M to the planned start address.
(4) Assign A$ to $M

Now type:

```
M=&DOO:A$=$M:M=&7FD8:
$M=A$ [Return]
```

and "ABRACADABRA" will be printed at the bottom right of the screen if your computer is in Mode 7. Otherwise it will not be recognisable. This technique accesses the screen memory directly. Although useful for examples, we do not recommend it for general programming.

If you use this method to look at sections of memory remember that you cannot print characters for all the Ascii codes you will find, as some are control codes.

Single key memory display

This program will display 128 bytes of memory starting at memory location M. Each line begins with the initial memory location, its contents and the contents of the next 7 bytes. The routine is short enough to be programmed into a single key.

Abbreviations are used where possible for the Basic key words, for example F. is short for 'FOR' and S. for 'STEP'. Page 483 of the User Guide lists the minimum abbreviation for the other Basic key words.

```
*KEY1 F.I=0 TO 127 S.8:@%=4:
ML=M+I:P.'~ML;:F.IL=0  TO
7:P.~ML?IL;:N.IL:N.I:P.'
```

The start address M must be defined before key f0 is pressed.

F.I=0 TO 127 S.8: Steps out the memory in banks of 8 bytes.

→

From Page 49

@%=4: For spaces for displaying each byte.

ML=M+I:

P.'~ML;: Prints the address of the first byte on this line.

F.IL=0 TO 7: Loop for each byte on the line.

P.~ML?IL;: Prints the contents of the byte.

N.IL: Next byte.

N.I: Next bank of bytes.

P.' Forces the cursor to the start of the next line.

If you type M=&B00 and press RETURN ,f1, RETURN you should display part of the memory page which contains the key definitions – and of course, it will display the key definition you have just entered!

If you find that the address is not the first number on each line of the display check to see if you have missed out the ' before the address is printed.

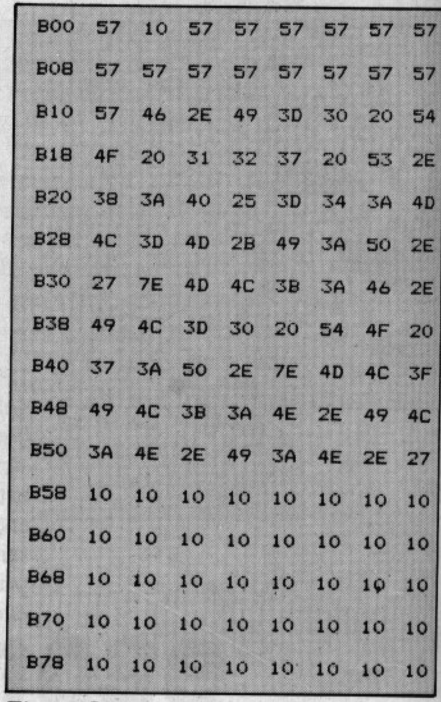
The display should appear as in Figure I.

Memory locations &B00 to &B0F contain the information for the definition of keys 0 to 15. If the key is defined, the corresponding byte contains the offset to be added to &B00 to give the start of the definition. If it isn't defined, the byte holds the offset giving the address of the final byte used for key definition, that is the next byte is free for putting a new definition in.

Memory locations &B00 to &B0F contain either the next byte free for key definitions 0 to 15 or the starting location of the key definition.

For example, &57 is the last byte used for key definitions and &10 in location &B01 means that the text in key 1 starts at the byte following &B10.

At this stage the Basic keywords have not been tokenised. The first two bytes of the definition are &46 which is "F" and &2E which is "."



```
B00  57  10  57  57  57  57  57  57
B08  57  57  57  57  57  57  57  57
B10  57  46  2E  49  3D  30  20  54
B18  4F  20  31  32  37  20  53  2E
B20  38  3A  40  25  3D  34  3A  4D
B28  4C  3D  4D  2B  49  3A  50  2E
B30  27  7E  4D  4C  3B  3A  46  2E
B38  49  4C  3D  30  20  54  4F  20
B40  37  3A  50  2E  7E  4D  4C  3F
B48  49  4C  3B  3A  4E  2E  49  4C
B50  3A  4E  2E  49  3A  4E  2E  27
B58  10  10  10  10  10  10  10  10
B60  10  10  10  10  10  10  10  10
B68  10  10  10  10  10  10  10  10
B70  10  10  10  10  10  10  10  10
B78  10  10  10  10  10  10  10  10
```

Figure I

Important zero page locations

Location	*Use*
&00,&01	LOMEM lo-hi.
&02,&03	Vartop (top of the variables).
&04,&05	Basic stack pointer.
&06,&07	HIMEM lo-hi.
&08,&09	ERL lo-hi.
&0A	Offset for the text pointer, either in Basic text or the input buffer.
&0B,&0C	Text pointer to the start of the current piece of Basic text.
&12,&13	TOP lo-hi.
&18	PAGE only the high byte.
&19,&1A	Secondary text pointer used for expression evaluation.
&1B	Offset for pointer.
&1E	COUNT.
&1F	LISTO option.
&23	WIDTH.
&24	Number of REPEATs left.
&25	Number of GOSUBs left.
&26	Number of FORs left times 15.
&27	Variable type.
&2A-&2D	Accumulator for integer work.
&2E-&35	First floating point accumulator.
&3B-&42	Second floating point accumulator.
&4B,&4C	Pointer to the current variable.
&70-&8F	Guaranteed empty for user's assembler code.
&FD,&FE	Location of the last error message.

Random access memory pages

Page number	*Use*
&00	Zero Page.
&01	6502 processor stack.
&02	OS workspace.
&03	OS workspace.
&04	&400-&480 System integer variables.
&481-&4FF	Variables catalog.
&05	FOR, REPEAT, GOSUB stack.
&06	String buffer.
&07	Line input buffer.
&08	Sound, envelopes.
&09	RS423 transmit buffer.
&0A	RS423 receive buffer.
&0B	User defined key definitions.
&0C	User defined character definitions.
&0D	Not used by cassette filing system.
&0E	Start of Basic program, for cassette files.
&0D-&19	Disc workspace.

BEYOND Z

By PETE BIBBY

WHEN I was a little lad my favourite story book was called On Beyond Zebra, which told of the adventures to be found when you leave the confines of the alphabet and travel beyond Z.

The author had invented a world inhabited by the weirdest of letters and little did I dream that 30 years later my BBC Micro would give me the same adventures – though with the slightly off-putting title of User Defined Characters.

These can be added to the character set already in the Micro's ROM to enable you to print unusual letters or shapes on the screen.

The normal character set consists of all the letters, capital and lowercase, the various punctuation marks and arithmetical symbols and so on.

Anything that appears on the screen via a PRINT statement is part of the character set. Each has a code number and you can print a character by using CHR$(N) where N is the code number of the character. Try PRINT CHR$(64) or PRINT CHR$(92) to see what you get. If you want to see some of the characters try the following program:

```
10 FOR I = 64 TO 255
20 PRINT CHR$(I),I
30 NEXT I
```

You may have noticed the gap between 224 and 255. This will come in useful later.

Now suppose you wanted to use another character set, say Russian letters or italics or maybe some other symbol not usually available. Can you do anything about it? With the BBC Micro you can define your own characters and it is very, very easy.

Let's imagine that you've been doing some statistical calculations and you want to use sigma, Σ, which means "the sum of the following numbers." This isn't in the normal character set, but we can make it available by defining it.

To define a character we use an 8 × 8 grid *(Figure I)*. On this we draw the character by blocking in the squares to get the shape we want. You don't need much artistic talent, just a pencil and a rubber. To get sigma we end up with something like Figure II.

Now we have to translate the picture drawn on the grid into numerical terms our micro can understand. It is quite a simple job which we achieve by giving each of the columns of the grid a numeric value, the first column on the left having the value 128, the next, 64, and so on to the last column which has the value 1 *(Figure III)*.

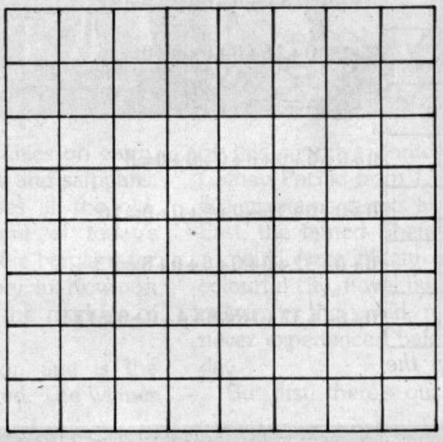


Figure I

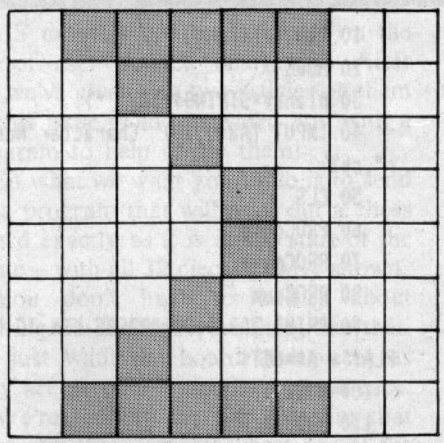


Figure II. A blocked diagram of sigma

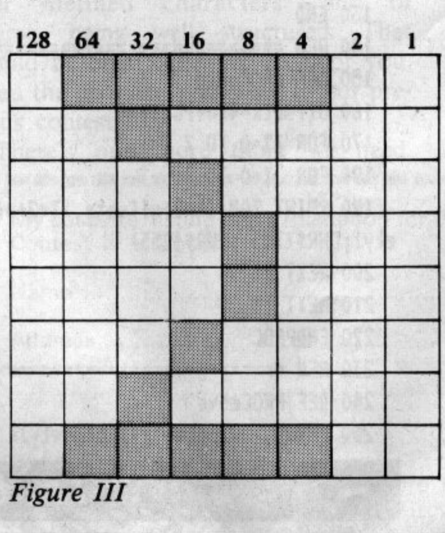
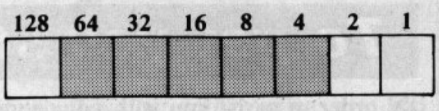


Figure III

Then we take each row at a time and add together the values of each column in that row that we have blocked in.

Let's take the top row of Figure III and go along it square by square from left to right. At the beginning the total is set to zero. If, as we go from left to right, a column is filled in, we add the value of that column to the running total. If it is not filled in we don't add anything. Our top row looks like this:



Let's start off at the beginning with our total at zero. Now the first square we come to is not filled in so we still have 0. The next is, the column value is 64 so 64 + 0 gives our total 64. The next square is also filled in, its column value is 32 so the total goes up to 96.

We carry on to the next square which is also filled, the column value taking the total to 112. Similarly the next square takes it on to 120 and the next on to 124. The last two squares in the row are empty so we add 0 to the running total for each and the final total is 124.

We write it down and start on the next row, with the total set to zero, working left to right square by square to get a running total for that row and so on. We end up with the data shown in Figure IV.

We now have all the numerical information for telling the micro to include a sigma in its character set.

You will remember that in the character set we had the values 224 to 255 to spare. We can use one of these numbers as the code number for sigma. Let's choose the number 240 as the code for sigma by entering VDU23, to tell the Micro we're defining a

→

From Page 51

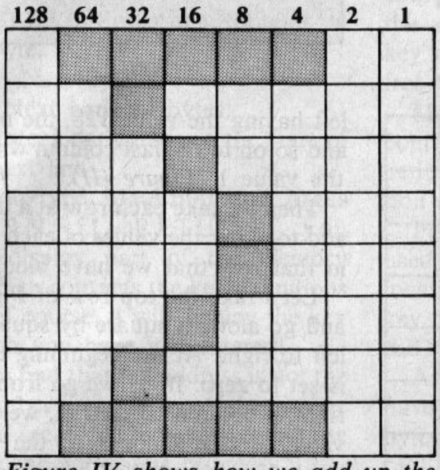
character, followed by 240 to say what the character code is to be. Then come the running totals taken in order, row by row, from top to bottom. We enter: **VDU 23,240,124,32,16,8,8,16,32,124** and press Return.

Now if we want to see our user defined character we enter PRINT CHR$(240) and hey presto, sigma – unless you are in Mode 7, as user defined characters don't work in that mode. And we can call it up time after time using CHR$240, or VDU 240.

Try drawing your own characters, it is easy and fun. Those of us who have OS other than 0.1 aren't restricted to just 224 to 255 for our user defined characters. However they are enough to be going on with.

Also you can put two or three of your creations together to form a composite character and can even animate it, as described in ?????

So there it is. On the BBC Micro you need never be confined to the character set. You, too, can go beyond Z.



0+64+32+16+8+4+0+0=124

0+0+32+0+0+0+0+0=32

0+0+0+16+0+0+0+0=16

0+0+0+0+8+0+0+0=8

0+0+0+0+8+0+0+0=8

0+0+0+16+0+0+0+0=16

0+0+32+0+0+0+0+0=32

0+64+32+16+8+4+0+0=124

Figure IV shows how we add up the values of the shaded squares.

See for yourself how they make the BBC Micro

Win our holiday of a lifetime ~in exciting Hong Kong

To get you started . . .

IN order to assist you with your competition entries, Percival has come up with a program to help design your user defined characters.

When you run it, it asks which character number you wish to define – you answer in the range 240 to 255, although it doesn't check on this.

You are then presented with an 8 x 8 grid of red blocks. You can move the cursor about the grid by means of the cursor control keys.

The grid represents the character you wish to define. If you want a particular block "shading in" just move the cursor to that block and press the space bar. The block will then turn blue, signifying that we have "shaded it in" to be used as part of our character.

If, as you're designing your character, you decide that you would like to rub out one of your blocks, just move the cursor to that block and press space. It will change back to red again.

When satisfied with your creation simply press the S key.

The program does all the necessary sums and prints out the VDU23 values needed to define that character, so make a note of them.

After this, pressing a key will display a diagonal line of the character you have defined in Mode 5.

```
   10 DIM val(7)
   20 MODE 7
   30 blank$=STRING$(38," ")
   40 INPUT TAB(0,10) "Character Numbe
r",ch%
   50 CLS
   60 PROCgrid
   70 PROCmove
   80 PROCsum
   90 PRINT TAB(0,22)"PRESS KEY TO DIS
PLAY": A$=GET$
  100 MODE 5
  110 PROCshow
  120 *FX4,0
  130 END
  140 REM ===========================
  150 DEF PROCgrid
  160 offsetx=4:offsety=4
  170 FOR I%=0 TO 7
  180 FOR J%=0 TO 7
  190 PRINT TAB(J%*2+offsetx,I%*2+offs
ety);CHR$(145);CHR$(255)
  200 NEXT J%
  210 NEXT I%
  220 ENDPROC
  230 REM ===========================
  240 DEF PROCmove
  250 PRINT TAB(offsetx+1,offsety);
  260 *FX4,1
  270 pos=POS:vpos=VPOS
  280 PRINT TAB(0,20)" S to stop. SPAC
E toggles colours."
  290 REPEAT
  300 key=INKEY(0)
  310 IF key=136 AND pos>offsetx+2 THE
N pos=pos-2
  320 IF key=137 AND pos<offsetx+14 TH
EN pos=pos+2
  330 IF key=138 AND vpos<offsety+14 T
HEN vpos=vpos+2
  340IF key=139 AND vpos>offsety THEN
vpos=vpos-2
  350 PRINT TAB(pos,vpos);
  360 IF key=32 THEN PROCchar
  370 UNTIL key= ASC("S")
  380 ENDPROC
  390 REM ===========================
  400 DEF PROCchar
  410 PRINT TAB(pos-1,vpos);
  420A%=135:C=((USR&FFF4) AND &FFFF) D
IV &100
  430 C= 145 -( C=145 )*3
  440 PRINT TAB(pos-1,vpos);CHR$(C);CH
R$(255);
  450 ENDPROC
```

That's all the help you'll get!

HONG KONG is easily one of the most fascinating cities on earth. Its harbour a glittering spectacle of hundreds of junks and sampans. Its restaurants a paradise for gourmets. It epitomises all the old-world romance of the Orient, plus the excitement of today's electronic marvels. Its intriguing shops offer unbelievable bargains for computer buffs. And from the bustling Wong factory in Kowloon pour thousand upon thousand of BBC Micros for the markets of the world.

An escorted tour of the BBC Micro production line is the highlight of the most fabulous prize we've ever offered. The winner of this month's contest – plus a companion – will be flown by Cathay Pacific from London to Hong Kong, where they will spend five nights as guests at one of the most luxurious hotels in the Far East, the famed Sheraton.

You'll have plenty of opportunities to explore this vibrant and colourful city, travel by rickshaw or the most advanced underground railway in the world, revel in sights, spectacles, even smells, you've never experienced before. All in all, it will be an unforgettable holiday.

But first, there's our contest ...

```
  460 REM ==============================
  470 DEF PROCsum
  480 FOR I%=0 TO 7
  490 T%=0
  500 FOR J%=0 TO 7
  510 PRINT TAB(J%*2+offsetx,I%*2+offs
ety);
  520 A%=135:C=((USR&FFF4) AND &FFFF)
DIV &100
  530 IF C=148 THEN T%=T%+2^(7-J%)
  540 NEXT J%
  550 val(I%)=T%
  560 NEXT I%
  570 PRINT TAB(0,20)blank$
  580 PRINT TAB(0,20)"VDU 23,";ch%;
  590 FOR I%=0 TO 7: PRINT;",";val(I%)
;:NEXT I%
  600 ENDPROC
  610 REM ==============================
  620 DEF PROCshow
  630 VDU 23,ch%:FOR I%=0 TO 7:VDU val
(I%):NEXT I%
  640 FOR I=0 TO 19:VDU ch%,10:NEXT
  650 ENDPROC
  660 MODE 5
  670 VDU 23,224,128,128,128,128
  680 VDU0,0,0,0
  690 VDU 224
```

Now it's up to you . . .

This is what you have to do

THIS month's contest is based on the use of user defined characters. After all, we've given you two articles on them in this issue – and provided you with a program to help create them!

So what we want you to do is to send us a program that will print out a chess board exactly as it is at the start of the game – with all 32 pieces clearly shown.

You don't have to bother about moving the pieces or anything like that, we just want the board and pieces as they are as play is about to commence.

We're looking for the program that does just that – making best use of the user defined characters – and, of course, being well structured. That should be child's play to most of you, given the excellent responses to our previous contests.

There's one more thing we need, though. Together with your cassette and listing we want a detailed explanation of how your program works. Who knows, if it's good enough you might end up working for us!

Send your cassettes, listing and explanations to: Hong Kong Contest, Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

And please mark each item clearly with your name, address and telephone number – and put "Hong Kong Contest" on the envelope.

If you want your cassette returning, please enclose a stamped addressed envelope. Otherwise it will be donated to a school.

- *Entries must be received by July 31, and each must include the entry form printed below, or a copy of it.*

Your FREE entry form

My cassette, listing and explanation for the BBC Micro Hong Kong Contest is enclosed.

Name ....

Address ....

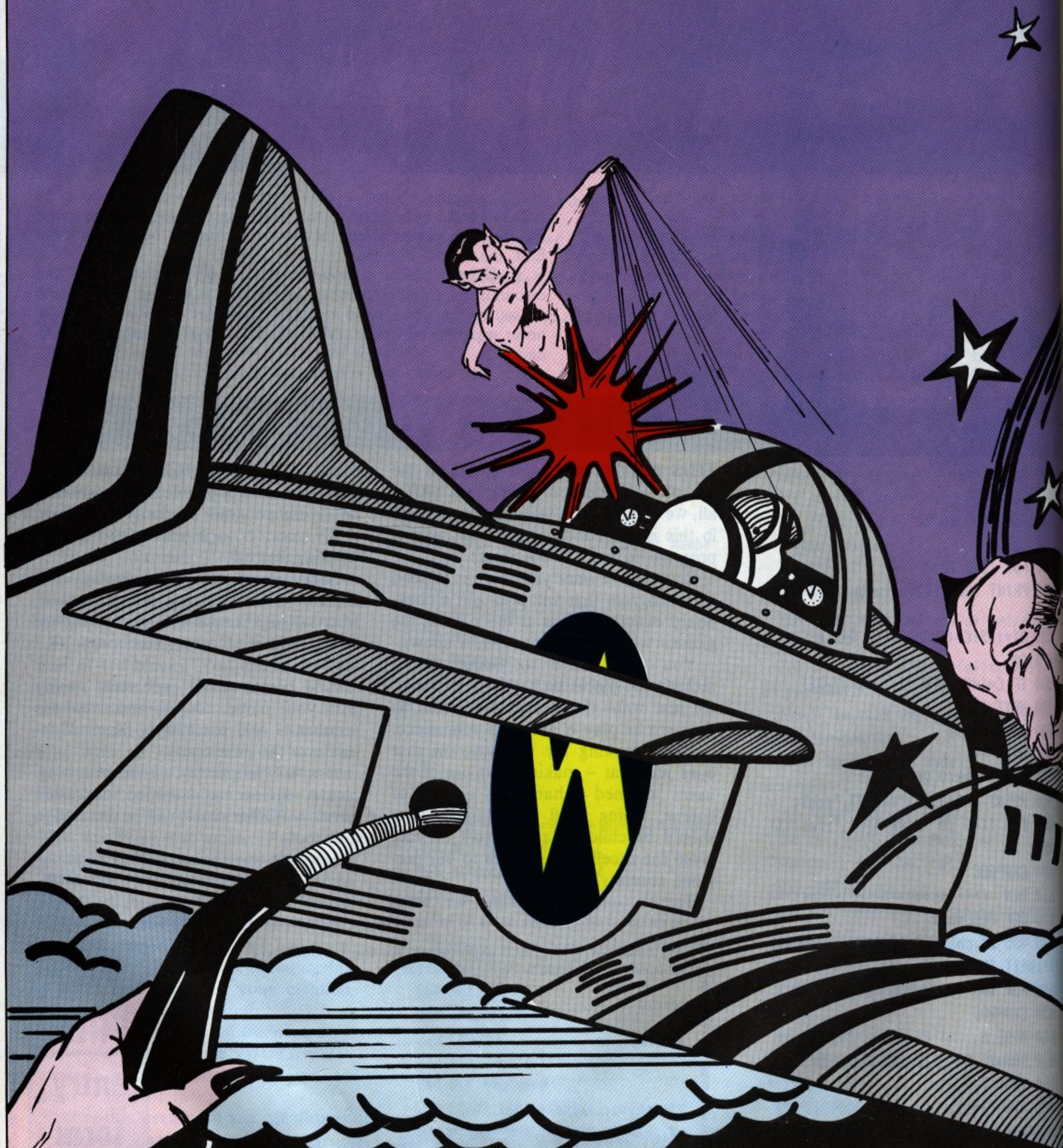
....

Tel. No ....

POST TO: Hong Kong Contest, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Climb into your model B and play JON McFARL

SPACE PILOT



Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Ecological Simulations	Simulate effect of various factors on distribution of organisms on the sea shore.		●		●		£16.50	Garland
Education, 1	Mathsrace and clock. For primary pupils.	●	●		●		£4.25	Microplus
Education, II	Spellbound and Life. For junior pupils.	●	●		●		£5.25	Microplus
Education, III	Three geography programs. Britain, USA and Europe.		●		●		£5.25	Microplus
Educational 1	For children aged 5 to 9. Includes Math 1, Math 2, Cubecount, Shapes, Memory, Spell, Clock.	●	●		●	£11.50	£8.05	Golem
Educational 2	For children aged 7 to 12.Includes Math 1, Math 2. Teaches the theory of electricity.		●		●		£5.50	Database

Education section to be continued next month

Programs featured in this Guide are supplied by:

BAKsoft, 34 Humberstone Road, Cambridge; **BBC Micro User,** Europa House, 68 Chester Road, Hazel Grove, Stockport; **Beecon** Educational Software, Bedfield Lane, Headbourne Worthy, Winchester, Hants; **Busco,** 16 Colwill Walk, Mainstone, Plymouth; **Carvells,** 3/7 Bank Street, Rugby; **CUP** (Cambridge University Press), Edinburgh Building, Shaftesbury Road, Cambridge; **CPE** (Central Program Exchange), The Polytechnic, Wolverhampton; **Chalksoft,** Lowmoor Cottage, Tonedale, Wellington, Somerset; **Clares** Micro Supplies, Providence House, 222 Townfields Road, Winsford, Cheshire; **CMS** (Computer and Media Services), Sherwood, Woodhouse Lane, Holmbury St. Mary, Dorking, Surrey; **Computer Concepts,** 16 Wayside, Chipperfield, Herts; **Computercat,** 224 Chapel Street, Leigh, Lancs; **Corona** Software, 73 High Road, S. Woodford, London; **Cottage** Software, Heather Cottage, Selly Hill, Whitby, N. Yorkshire; **Contex** Computing, 15 Woodlands Close, Cople, Bedford; **DACC,** 23 Waverley Road, Hindley, Lancs; **Database** 27 City Road, Stoke, Staffs; **Dial** Software, 72 Downend Road, Downend, Bristol; **Digital Fantasia,** 24 Norbreck Road, Norbreck, Blackpool; **Electronics Applied,** 4 Dromore Road, Carrickfergus, Co. Antrim; **FBC** Systems, 10 Castlefields, Main Centre, Derby; **Focusplan,** Focus House, 57 Westgate, Cleckheaton, W. Yorks; **Gaelsett** Software, 44 Exeter Close, Stevenage, Herts; **Garland** Computing, 35 Dean Hill, Plymouth, Devon; **GEM** Software, 1 Oswald Road, Leamington Spa; **GJ Associates,** 35 Donovan Avenue, London; **Golem,** 77 Qualitax, Bracknell, Berks; **Griffin & George,** 285 Ealing Road, Alperton, Wembley, Middlesex; **GT Software,** 8 Bull Street, Potton, Sandy, Beds; **H & H** Software, 53 Holloway, Runcorn, Cheshire; **J. Hargreaves,** Updown, Pewley Way, Guildford, Surrey; **Heinemann** Computers in Education, 22 Bedford Square, London; **Simon W. Hessel** Software, 15 Lytham Court, Cardwell Crescent, Sunninghill, Berks; **Hexagon** Software, 17 Straits Road, Gornal, Dudley, West Midlands; **Hopesoft,** Hope Cottage, Winterbourne, Newbury, Berks; **IJK** Software, 9 King Street, Blackpool, Lancs; **Kosmos** Software, 1 Pilgrims Close, Harlington, Dunstable, Beds; **Level 9** Computing, 229 Hughenden Road, High Wycombe, Bucks; **Logic** Systems, 85 Hemingford Road, Cambridge; **Longman** Group, Longman House, Burnt Mill, Harlow, Essex; **David McKeran,** 23 Warwick Drive, East Herrington, Sunderland, Tyne & Wear; **Mayday** Software, The Paddock, 73 Olfield Road, Stannington, Sheffield; **MGB** Software Support, 52 Barley Croft, Harlow, Essex; **Micro-Aid,** 25 Fore Street, Praze, Camborne, Cornwall; **Micro-Jenn** Software, 81 Squirrels Heath Road, Harold Wood, Essex; **Micromode,** 32 West End Avenue, Gatley, Ches; **Microplus** Software, 6 Litton Way, Leeds; **Micro Power,** 8/8a Regent Street, Chapel Allerton, Leeds; **Microwave NW,** 24 Belford Road, Stretford, Manchester; **MP Software,** 165 Spital Road, Bromborough, Wirral, Merseyside; **NEC** (National Extension College), 18 Brooklands Avenue, Cambridge; **Ordura** Consultants, PO Box 179, Sheffield; **Paean** Systems, Wuebec House, Little Bealings, Woodbridge, Suffolk; **Primasoft,** 2 Spinney Close, Glossop, Derbys; **Pro Software,** 121 Tyn-y-Twr, Baglan, Port Talbot, West Glam; **Processor** Applications, 22 Mercer Close, Basingstoke, Hants; **RMK** Electronics, Hinton House, Station Road, New Milton, Hants; **Ross** Software, 44 Premier Avenue, Grays, Essex; **Salamander** Software, 27 Ditchling Rise, Brighton, Sussex; **Schoolsoft,** 19 Shadwell Grove, Radcliffe-on-Trent, Nottingham; **Secta** Software, 14 Bracadale Close, West Coombe Park, Coventry; **Simonsoft,** Front Street, Topcliffe, N. Yorks; **Smash Hit** Software, 11 Calfridus Way, Bracknell, Berks; **Softefex,** 11 All Saints Road, Creeting, St. May, Ipswich; **Software Invasion,** 50 Elborough Street, Southfields, London; **Square** Software, 12a Uplands Terrace, Swansea, W. Glamorgan; **Squirrel** Software, 4 Bindloss Avenue, Eccles, Manchester; **Stable** Software, Compton Street, Compton, Nr Winchester, Hants; **Superior** Software, 69 Leeds Road, Bramhope, Leeds; **Zero** Software, 29 St. Michaels Close, North Walthams, Basingstoke, Hants.

Part II of the Guide to Software for the BBC Micro will appear in the July issue of The Micro User. It will include many more games and educational programs, together with new sections covering utilities, languages and domestic programs.

● *While every care has been taken in compiling details for this Guide, no responsibility can be accepted for any errors or omissions.*

Fold

THE MICRO USER

Guide to Software for the BBC Micro

GAMES

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
3D Maze	The computer sets up logical mazes, then shows maze in 3D at each step taken to escape.		●		●		£4.50	IJK Software
Abductor	Save your humanoids from kidnap from the sky, using your plasma cannon to destroy the abductor.	●	●		●		£7.95	Salamander
Adventure	Game requiring skill and imagination. Explore forests, caverns, dungeons and rescue Princess.	●	●		●		£7.99	Micro Power
Adventure Quest	Sequel to Colossal Adventure. Epic journey with over 200 individual locations and many puzzles.		●		●		£9.90	Level 9
Air Strike	A fast and furious arcade game. Plus Pelmanism, Anagrams and many other programs.		●		●		£3.75	BBC Micro User
Alien	Stop the aliens reaching ground as they drop in one, two and thousands at a time.	●	●		●		£6	FBC
Alien Dropout	Machine code arcade game. Killer moths have to be destroyed before they attack in force.		●	●	●	£11.95	£7.95	Superior
Android Attack.	Not to be underestimated. A high standard game.		●		●		£7.80	Computer Concepts
Anglezap	Zap the aliens as you master angles and bearings. Arcade action with animated graphics.		●		●	£10	£7.50	Gem
Apollo	Lunar Lander with a difference. Comprises orbit, long range, mid range, detailing landings, etc.		●	●	●		£6.95	Software Invasion

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Atlantis	Fast action arcade game in machine code. Guide Nautilus through caverns, avoiding mines, etc.		●		●		£7.50	IJK Software
Asteroid Belt	Simple asteroid game which includes a pair of games paddles in the price.		●		●		£11.50	Electronics Applied
Astro Navigator	Fly through caverns. Climb, dive, reverse and thruster controls. Five skill levels.		●		●		£5.69	Micro Power
Backgammon	You play the computer in this accurate translation of the board game.		●		●		£6.95	Microplus
Barrage	Two players control last few guns of opposing armies. Decide fire angle and velocity from wind.		●		●		£6.84	Micro Power
Battle	Simulates a minefield crossing with arcade style scoring and sounds.		●		●	£4.45	£2.95	Micro Aid
Battleships	Sink the computers fleet before it finds yours.	●	●		●		£4.50	Microplus
Beeb Chase	A chase type game similar to Pacman.		●	●	●	£9.95	£7.50	Database
Beebmunch	Version of Pacman arcade game with hi-res colour graphics, multi ghosts, fruits, superpoints, etc.		●		●		£6.50	IJK Software
Billiards	Game of skill and cunning. Key in direction, pace and backspin on your cue ball and watch result.		●		●	£10	£8.50	H and H
Black Hole	Fly the spaceship through meteor swarm, shoot asteroids, proceed througb black hole into chaos.		●				£6.95	CMS
Blitz	Fly your own bomber mission.	●	●				£3.95	Microplus
Blue Dragon	Try to recover hidden treasure guarded by a fierce dragon. Mode 7 display. Text only		●		●		£6.50	MP Software
Bomber Run	Fly your bomber over rough terrain. Targets to bomb, missiles to dodge, enemy planes to shoot down.		●				£6.95	CMS
Bounce	A frustrating bat and ball game with varying levels of skill.	●	●		●		£4.95	Computercat
Bunfun	Buns come along the belt in semi-random fashion. You choose the speed. Squirt on the icing.	●		●			£6.50	Squirrel
Carchase	Fast moving real time game where you drive round a track chased by a computer controlled car.		●		●			Ross
Cards	Game similar to popular TV card game.	●	●		●	£4.45	£2.95	Micro Aid
Caveman Adventure	An adventure program which takes you through caves, wasteland and jungle. Watch for wild animals.		●		●		£6.84	Micro Power
Caves of Anoron	Retreive the Golden Grail hidden in the labyrinths of Anoron, avoiding monsters of all sorts.		●		●		£7	FBC
Centipede	Arcade style action with centipedes, spiders, snails and flies in field of mushrooms.		●		●	£11.95	£7.95	Superior
Channel	Prevent the enemy from sailing down the channel and attacking the fleet.	●	●	●	●		£3.95	Microplus

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Cassette 2	Two programs teach addition and subtraction. Success rewarded with amusing graphics. Ages 8 to 11.	●	●		●		£7.50	Cottage
Cassette 3	Two programs teach long multiplication and division. Rewards include mathematic Hangman game.	●	●		●		£7.50	Cottage
Cassette 4	Two programs for the very young teach elementary addition							
Cassette 5	Two programs teach addition, subtraction, and multiplication and division of fractions.		●		●		£7.50	Cottage
Chemistry	Adds fun to learning atomic symbols, weights, etc. Four levels of knowledge from beginners upwards.		●		●		£6.84	Micro Power
Childrens Tape	A collection of games for children, each helping to develop a particular skill.	●	●		●		£5	Softefex
Circuits and Diodes	Simulation of experiments with simple and complex electrical circuits with diodes.		●				£11	Garland
Circuits and Switches	Simulation of experiments with simple and complex electrical circuits with switches.		●				£11	Garland
Climate	Analysis of temperature and rainfall data from graphs or tables to identify type of climate.		●		●	£12.50	£12.50	Heinemann
Contf	Continuous flow calorimetry.		●		●			Central
Constellation	Accurate plotting of stars and constellations. Hi-res graphics display. More than 450 stars.		●		●		£6.84	Micro Power
Coordinates and Lines	Four programs to help children with fractions.		●	●	●		£7	Garland
DNA	Shows structure of DNA and replication of double helix, including discontinuous synthesis.		●		●		£15	Garland
Decimals	Menu driven interactive practice in decimal calculations of all kinds. Ages 10 to 17 plus.		●		●		£7.95	Chalksoft
Dieting	For use by class of up to 24 pupils. Shows how to select diet for various types of person.		●		●		£9	Garland
Directed Numbers	Three programs use moving graphics to show how positive and negative numbers are added, subtracted.		●		●		£7	Garland
Disc Based Stats Pac	All features of Focusplan Pro Stat Parts 1 and 2, with improved editing and review facilities.	●	●		●	£19.95		Focusplan
Distances	Gives distance between any two places on earth. Three maps and over 60 named places as well.		●		●	£5.45	£3.95	Micro Aid
Dval	X-ray diffraction D values.		●		●			Central
Dynamic NMR	Chemistry. Calculates NMR line shape for two site exchange, with and without coupling.		●		●	£12	£9.50	Microwave NW
Early Series	Series of 5 fun tapes to help children read. Pictures match sounds, words and sentences.	●	●		●	£8	£6.50	H and H

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Graphics Planner	Program to aid drawing of teletext pictures with laminated chart and water soluble pens. A3 size.	●	●		●	£12	£9.50	Microwave NW
Tess	A program for graphic designers or just for fun. Draw a shape and computer makes it tesselate.		●		●	£10	£8.50	H and H

More programs featuring graphics will be found in the education section

EDUCATiON

Title	Description	Model A	Model B	Joystick	Keyboard	Disc	Cassette	Supplier
30 Hour Basic	A set of two cassettes of all the main programs in the 30 Hour Basic course	●	●	●	●		£11.96	NEC
Action of the Heart	Visual aid and self-tuition program on anatomy and function of the heart.		●		●		£11	Garland
Angle	Four programs. Two demonstrate angular concepts, two test them. Hi-res graphics. Age 7 upwards.		●		●		£8.95	Chalksoft
Angles	Five programs using graphics and simple games to show how angles are formed and named.		●				£7	Garland
Animal, Vegetable, Mineral	Computer tries to guess object thought of. Full monitoring facility. Ages 7 to 13.	●	●			£9.95	£4.95	Bourne
Approximation	Practice in rounding numbers, estimating answers, converting between decimal and scientific.		●		●	£12.50	£12.50	Heinemann
Arithmetic	Four arithmetic programs for infants. Help facility, colour, moving graphics, work sheet.		●		●		£12	Schoolsoft
Bact	Biology. Growth of bacteria.			●	●			Central
Balance Your Diet	Shows students how to analyse their own diet and compare it with others, i.e. third world peasants.		●			£18	£18	CUP
Beeb Beep	Excellent version of Simon, much enjoyed by children. Includes choice of colours and sounds.		●		●		£4.50	IJK Software
Blood Circulation Maze	Revision program for use by class of up to 24 pupils. Maze game helps learning about blood vessels.		●		●		£9	Garland
British Cities and Ports	Two programs to teach location of British cities and ports. 12 locations in each program.		●		●		£8	Schoolsoft
Call Your Bluff	A dictionary definition game for 1 to 5 players.		●		●	£10	£7	Square
Capitals	Multiple choice quiz testing knowledge of countries of the world and their capitals.		●		●	£10	£7	Square
Capitals	Five programs to complement Chalksoft Letters by drawing upper case letters and numerals.		●		●		£9.95	Chalksoft
Carousel	Simon-like game. Sequences of up to 10.		●		●		£5	Schoolsoft
Cassette 1	Two programs teach and give practice in addition and times tables. Choice of easy or hard.	●	●		●		£7.50	Cottage

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Chess	Very strong game with good hi-res graphics. Full machine code.		●		●		£10	Computer Concepts
Chess	Six skill levels. Options include Blitz chess when moves must be made in 10 seconds.	●			●		£5.69	Micro Power
Chess B	Six skill levels. Machine code program in Mode 1 colour graphics. Blitz chess option. Game replay.		●		●		£7.99	Micro Power
City Defend	Defend the cities from attack.		●	●			£4.95	MGB
Codebreaker	Screen version of classic peg game but with up to 26 colours and holes.		●		●		5.50	Squirrel
Codecracka/Hilo	Mastermind and play your cards right.	●	●		●		£3.95	Microplus
Colossal Adventure	Full size version of classic mainframe game Adventure. Plus complete new end game and puzzles.		●		●		£9.90	Level 9
Compendium	Three board games to test your powers of logic. For 1 or 2 players.		●		●		£5.95	Computercat
Connect 4	Highly sophisticated version of this popular game. You can play the machine.		●		●	£9.95	£5.99	Database
Copter	Sound operated game for the physically handicapped.		●	●	●		£4.99	Micromode
Cowboy Shootout	Two player cowboy game. Shoot or be shot. Take cover behind cactus plants and wagons.		●		●		£6.84	Micro Power
Croaker	Excellent version of popular arcade game. Frogs must be guided across busy road and dangerous river		●		●		£7.99	Micro Power
Crossword Puzzler	Programs to create and and play puzzles, plus four sample crosswords.		●		●		£5	NEC
Deathwatch	Superb arcade game that challenges you to use your skill fighting off enemy tanks and helicopters.		●		●		£3.75	BBC Micro User
Demolish	Knock down fun	●	●		●		£3.95	Microplus
Descender	All action arcade style game. A hazardous mission to the centre of the earth. Nine skill levels.		●		●		£7.50	FBC
Devil Run	This game is similar to Nightmare Park, but considerably more difficult.		●		●	£9.95	£7.50	Database
Dive Bombers	Shoot down the kamikaze dive bombers while dodging their bombs. Many waves of different planes.		●				£6.95	CMS
Dots and Boxes	Join the dots to score against the computer.	●	●		●		£4.25	Microplus
Dragon Rider	Family arcade game. Ride your fiery steed round the sky using laser lance to destroy alien menace.		●		●		£7.95	Salamander
Draughts	A draughts program with two levels of skill.		●		●		£5.95	Logic Systems
Dungeon Adventure	Massive adventure with more than 100 puzzles to solve. Rich vein of humour throughout.		●		●		£9.90	Level 9
ESP	Test your ability to predict the future.		●		●			Ross

	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Eliza	Have a conversation with your computer psychiatrist via your keyboard and this program.		●		●			Ross
Eldorado Gold	Adventure game set in the Old West. Avoid Indians and Big Jake to find the treasure of gold.		●		●		£6.84	Micro Power
Escape from Orion	Fast action arcade game takes Donkey Kong into the 21st century. Four screens. Many other features.		●	●	●		£6.75	Hopesoft
Family Games	Contains Hangman, Kryptogram, Dice, Beetle, Grand National and Music.	●	●		●		£4.50	IJK Software
Firienwood	Journey through an enchanted forest to find the Golden Bird of Paradise. Mode 7 display. Text only.		●		●		£6.50	MP Software
Fives and threes	Dominoes game. Knock spots off your computer.		●		●		£5.95	Microplus
Footer	Two player game of football skills. Running, dribbling, shooting. Hi-res graphics.		●		●		£7.99	Micro Power
Frogger	Arcade quality machine code version with beautiful graphics. Crocodiles and diving turtles.		●	●	●	£11.95	£7.95	Superior
Fruit	Addictive fruit machine simulation game with hold, gamble and nudge features.	●	●		●		£5	Cottage
Galactic Commander	Land a space vehicle against increasing gravitational pull, avoiding homing missiles.		●		●		£7.99	Micro Power
Galaxian	Arcade quality game using machine code. Vivid Mode 1 colour, moving stars, hi-score, bonus ship.		●	●	●		£6.95	Software Invasion

Games section to be continued next month

BUSINESS

	Description	Model A	Model B	Joystick	Keyboard	Disc	Cassette	Supplier
Beebcalc	The only ROM based spreadsheet program currently available. ROM only at £34.		●		●			Computer Concepts
Broadplan	Spreadsheet program. 80 columns. Easy to set up for cash flow projection, financial analysis, etc.		●		●	£24		RMK
Cashbook	Double entry two column system with accounts, ledgers and nominal ledger.		●		●	£7.45	£5.95	Micro Aid
Database	Comprehensive database facilities include fast search, sort, search and replace, etc.		●		●	£12.95	£9.95	Primasoft
Database	Menu driven database with add, change, search, sort, delete and display routines.		●		●		£12.95	Computercat
Easycalc	Spreadsheet processor, disc or tape files. Up to 2,000 cells.		●		●		£12.95	Zero Software
Easyplan	Disc based financial modeller.		●		●	£60		Zero Software
Filer	File handling program which allows user to build up, manipulate, store and retrieve data.	●	●		●		£10.29	Micro Power
Ledger	Complements Micro Aid Cashbook and allows checks to be kept on accounts.		●		●	£7.45	£5.95	Micro Aid

Fold -

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Mailing	Address file for listing and sorting by name or postcode. Labels of any size handled.		●		●	£7.45	£5.95	Micro Aid
Micro Budget	Personal finance program enabling the recording, review and analysis of budget and income, etc.	●	●		●		£7.99	Micro Power
Nominal Ledger	Maintains records of expenses, income, assets and liabilities to produce balance sheet, etc		●		●	£195		RMK
Payroll	Full PAYE system including three NI codes, for contracted in, all PAYE codes. Overtime facilities.		●		●	£15.45	£13.95	Micro Aid
Sales Ledger	Maintains records of debtors to produce full audit trail, statements, aged debt analysis, etc.		●		●	£195		RMK
Scred	Screen editor and word processor. Over 50 functions for creating, checking and modifying programs.		●		●	£23	£18	Stable
Spreadsheet	Over 1,000 cells up to 26 by 99. Build, modify, read, write, print, functions, variables, text, etc	●	●		●		£8	Contex

WORD PROCESSING

Title	Description	Model A	Model B	Joystick	Keyboard	Disc	Cassette	Supplier
Alphabeta	WP package for use with most printers. Insert, delete, centre, print emphasis, underline, tabs, etc		●		●	£16	£14.50	H and H
Pro Word	Full feature word processor. On screen editing and justification. Written in machine code.		●		●	£19.95		Pro Software
Worded	Simple word processor written entirely in Basic for those who want to know how they work.		●		●		£5.95	Processor Applications
Wordpro	For either Epson or Seikosha printers. Justification, alter, delete, pages to tape.		●		●		£10.50	IJK Software
Wordscan	Easy word processing for Epson MX80FT III and other printers. Can produce 400 lines of text.		●		●		£12	Dial
Wordwise	Rom based word processor for the BBC Micro. Very easy to use and a best seller. ROM only at £39.		●		●			Computer Concepts

GRAPHICS

Title	Description	Model A	Model B	Joystick	Keyboard	Disc	Cassette	Supplier
Easy Graphics	Highly versatile, easy to use graphics program generator. Simplifies production of maps, graphs.		●		●		£13.50	Hexagon
Grafdisk	Same as Grafkey, but also provides screen save		●	●	●	£12.95		Clares
Grafik	Same as Grafkey, but can be used with joystick or keyboard.		●	●	●		£8.95	Clares
Grafkey	Advanced CAD type program. Allows complex drawings to be created and saved to tape.		●		●		£7.95	Clares
Grafstik	Same as Grafkey, but for use with joystick.		●	●			£7.95	Clares

NE'S . . .

IN this game for the model B you are in control of a spaceship lost in space, with dwindling supplies of fuel and laser energy. To make matters worse, you stumble across a fleet of bloodthirsty aliens who attack your craft in numbers, intent on your destruction.

You must fend them off with the lasers on board, but your power is limited and your fuel level drops all the time.

The situation is not too bad though, because you can replenish your stores of energy and fuel by docking with a supply satellite and you can repair damage caused by the aliens by landing on a friendly planet.

As the game progresses, the aliens become faster and deadlier, and eventually even the most skilful pilot is sure to be overwhelmed.

When the game starts you are presented with a screen in two parts, the warning dials and fuel and laser gauges in one part and a visual display the other.

There are three parts to the game, and each will produce different views on the display. Instructions concerning what you have to do and how you move are given in the program.

Briefly, the first part is direct combat, where you have to destroy the aliens. Secondly, you must dock with a supply satellite, and thirdly you must guide your lander to a pad on a planet to repair damage.

When your damage points reach five or your fuel runs out, the game ends and a high score table is displayed.

The program itself consists of a main loop which calls three procedures, one for each part of the game. These in their turn call other procedures to perform other functions.

Lines 10-90 initialise graphics, envelopes, display the instructions and select Mode 1.

Line 110 initialises all the variables to be used in the game, and calls a procedure to draw the screen.

Lines 120-150 are the main loop of the program.

Lines 220-320 deal with the high score table.

PROCINST displays instructions.

PROCI initialises variables used in the game.

PROCS initialises the screen.

PROCAL/PROCA deal with the movement and firing of aliens.

PROCLAND deals with the landing on a planet section.

PROCDOCK deals with the docking section.

PROCT displays any warning messages in the scanners (this will be

Space Pilot listing starts on Page 60

From Page 59

seen when the game is played).

PROCM takes inputs form the keyboard and acts accordingly.

PROCG is the firing routine when you press the space bar.

PROCRUB draws the approaching aliens on the screen.

PROCCRO draws your sights on the screen.

PROCFU increases fuel and laser energy after a successful docking or landing.

PROCFO decreases fuel.

PROCQ decides what part you will face next.

A few hints . . .

*The program only just fits into memory, so I have deleted REM statements and unnecessary spaces. I would advise you to do the same. For disc owners, you will need a downloading routine, and I would recommend *TAPE: FORN%=PAGE TO TOP STEP 4:!(N%–2816) = !N%:NEXT: PAGE=&E00: OLD which does the job relocating from &1900 to &E00 four times faster than the common downloading routine using ? instead of !.*

It is easy to confuse PROCRO and PROCCRO or PROCFU and PROCFO. Don't – it will not crash the program, but it will not run properly.

When the program is run, and you are confronted by an alien, it might be confusing at first to find that when you move up the alien moves down, but remember that you are moving your ship, so the alien moves in the opposite direction that you do. This does not apply to the other two stages of the game.

Space Pilot listing

```
 10 REM By J.McFarlane 1983
 20 ON ERROR RUN
 30 MODE 7
   :PROCINST
 40 VDU 23,255,255,255,255,255,255,25
   5,255,255,23,224,129,90,60,231,23
   1,60,90,129,23,225,60,255,126,60,
   66,129,129,129,23,226,0,0,0,0,24,
   24,36,0
 50 ENVELOPE 1,1,10,10,30,0,0,0,0,0,-
   1,-1,126,0
   :*FX9,10
 60 *FX10,10
 70 MODE 1
 80 DIM HI$(5)
   :DIM H%(5)
   :FOR N%=0TO 5
   :HI$(N%)="BBC"+STRING$(15,".")
   :H%(N%)=1000
   :NEXT
 90 VDU 23;8202;0;0;0;
110 PROCI
   :FOR N%=1TO 3
   :VDU 19,N%,0;0;0
   :NEXT
   :PROCS
   :VDU 20
120 PROCT
   :IF INKEY (-99)AND L%>8PROCG
130 IF V%>0PROCAL
   ELSE IF RND (10)=1PROCQ
   :GCOL 0,3
   :PROCCRO
140 IF DA%>4GOTO 220
   ELSE IF F<8GOTO 210
150 GOTO 120
160 DEF PROCM(RQ%)
   :IF INKEY (-98)Y%=Y%-RQ%*(20/W%)
170 IF INKEY (-66)Y%=Y%+RQ%*(20/W%)
180 IF INKEY (-122)X%=X%+RQ%*(30/W%)
190 IF INKEY (-26)X%=X%-RQ%*(30/W%)
200 ENDPROC
210 VDU 4
   :PRINT TAB(16,10);"Fuel Out"
   :TIME =0
   :REPEAT UNTIL TIME >200
220 CLS
   :VDU 4
   :PROCSPI
230 PRINT TAB(15)"HIGH SCORES"
   :*FX15,1
240 PRINT ''
   :COLOUR 1
   :FOR N%=0TO 5
   :IF N%>0
   :COLOUR 3
245 PRINT TAB(9,(N%*2)+5);HI$(N%);H%(
   N%)
   :NEXT
250 COLOUR 3
   :IF S%<H%(5)GOTO 320
260 N%=-1
   :REPEAT
   :N%=N%+1
   :UNTIL S%>H%(N%)OR N%=5
   :IF N%=5GOTO 280
270 FOR M%=4TO N%STEP -1
   :HI$(M%+1)=HI$(M%)
   :H%(M%+1)=H%(M%)
   :NEXT
280 H%(N%)=S%
   :PRINT TAB(13,24)"Hi-score !!!"
290 PRINT ''TAB(11)"Enter your name-"
   '''TAB(12);
300 VDU 31,32
   :INPUT A$
   :IF LEN (A$)>=18A$=LEFT$(A$,18)
   ELSE REPEAT
   :A$=A$+"."
   :UNTIL LEN (A$)=18
310 HI$(N%)=A$
   :S%=0
   :GOTO 220
320 PRINT TAB(12,24);"Press 'S' for
    new"''TAB(18);"game."
   :REPEAT UNTIL GET$ ="S"
   :CLS
   :GOTO 110
330 DEF PROCNEWS
   :COLOUR 2
   :VDU 19,3,0,0,0,0,19,1,0,0,0,0,19
   ,2,9,0,0,0
   :PRINT TAB(10,10);"Attack wave
    repelled"
   :PRINT TAB(10,12);"Bonus ";5000*H
   E%;" points."
   :TIME =0
   :REPEAT UNTIL TIME >200
   :S%=S%+5000*HE%
   :BSC%=20+10*HE%
   :PRINT TAB(10,10);SPC (20)
340 HE%=HE%+1
   :PRINT TAB(10,12);SPC (18)
   :PROCSTAR
   :PRINT TAB(11,29);S%
   :VDU 20
   :ENDPROC
350 DEF PROCBADGE(BA%)
   :IF BA%>9GOTO 370
360 GCOL 0,1
   :MOVE BA%*100,0
   :DRAW BA%*100+64,0
   :PLOT 85,BA%*100+32,64
   :VDU 5
   :GCOL 0,3
   :MOVE BA%*100+16,40
   :PRINT ;BA%
   :ENDPROC
370 IF BA%/10=INT (BA%/10)GOTO 380
   ELSE BA%=BA%-(INT (BA%/10)*10)
   :GOTO 360
```

This listing was produced by a Jim Notman formatter, which breaks one program line over several lines of listing. When entering a line don't press Return till you come to the next line number. Full details of the formatter will be given in next month's Micro User.

Turn to Page 97

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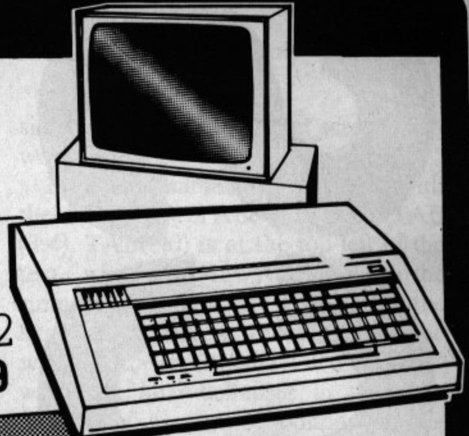

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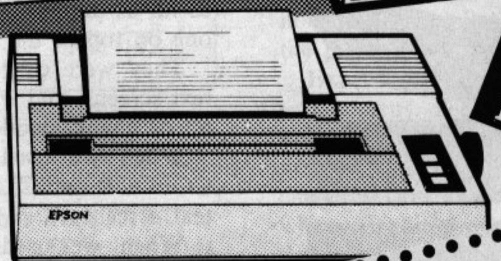

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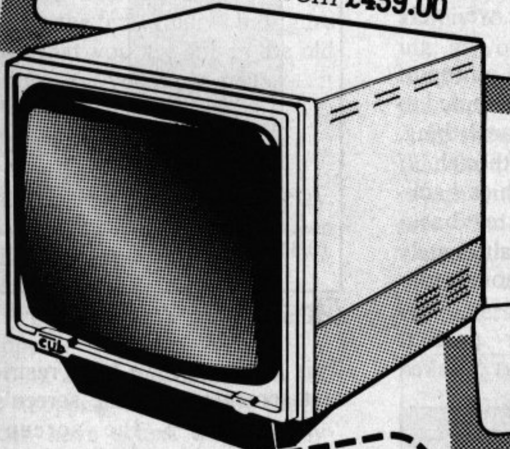

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GRAPHICS

By PAUL JONES

RIGHT – lots of "hands-on" this month, so let's get to it! Enter the following:

```
MODE 5
VDU 28,0,31,19,0
COLOUR 129
CLS
```

What exactly is going on? Well, cast your mind back a month or two. Do you remember that the display we look at is actually composed of two screens as far as the BBC Micro is concerned, one on top of the other?

They were called the graphics and text screens, and when you first switch on or change mode they overlap.

When we used PRINT, TAB( ), COLOUR and CLS we were using the text screen.

When we used MOVE, DRAW, PLOT, GCOL and CLG we were using the graphics screen.

Normally both screens are on top of each other, and we might be tempted to think of them as really the same thing.

They are quite separate, though. If you doubt me, set the graphics background to one colour and the text background to another. Then alternately try CLS and CLG. That should convince you!

But, to return to our present problem, if you've done what I asked you should be left with a screen red on the left half and black on the right, with some remnants of your typing.

VDU 28 has restricted the BBC Micro's text screen to the left half of the display. To use the jargon, we have created a text window. We'll go into the details in a moment. Let's just prove that we have made such a window and see what it means. Type:

```
CLG
```

Everything disappears to leave a blank screen, save for the prompt and the flashing cursor.

You see, the graphics screen is still full sized, and when you clear it you also wipe out what's on the text screen – that is, the red rectangle disappears. This should become clearer in a moment.

Notice that the prompt is written on a red background. After all, ">" is a text character, and so is printed on the text background, which is red.

Now hold down a key and keep it down so that it repeats. Surprised? The repeated letter only gets halfway across the screen before starting a new line.

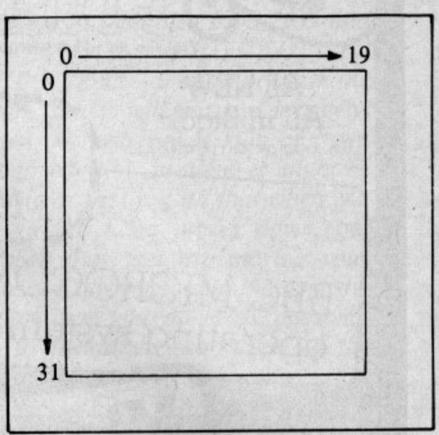

Figure I: Text screen in Mode 5

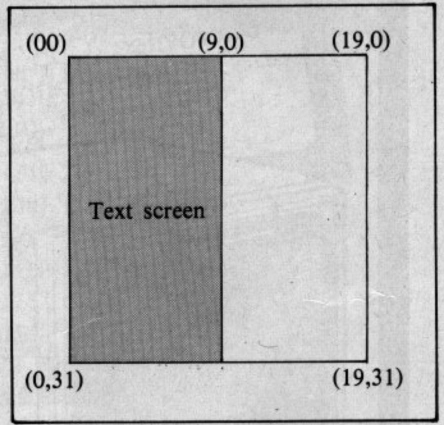

Figure II

This is because we have restricted the text screen to half the screen's width.

In Mode 5 the screen is 20 characters wide, numbered 0 to 19, as you can see from Figure I.

Now you can restrict this text screen to any particular rectangular "chunk" or window you choose. Of course, that rectangle mustn't slope, it must be upright.

Last month we saw how we could fix such a rectangle with just two points, the opposite corners.

To define a text rectangle, or window, we use VDU 28 followed by the character co-ordinates of the bottom left corner of the screen, then those of the top right corner.

Look at Figure II. This shows the text window we set up at the beginning of the article. To define, or fix the shaded area as a text window we typed

```
VDU 28,0,31,19,0
```

Notice that we use commas to separate the figures, but there is no final comma.

Although we have defined a text window, the graphics screen works normally. Try:

```
MOVE 0,0
DRAW 1279,1023
```

The graphic commands act as they usually do and overwrite the text window as if it weren't there. After all, the graphics screen still fills the whole of the display, and we have only limited the text screen.

Before you clear the screen, press the Return key and keep it down to see what happens. When the prompt reaches the bottom the text window will scroll as normal. However, the only part of the line we drew that scrolls up is the part that crosses the text window. The rest of the line is immune.

This means that if we use our windows carefully we can stop text and graphics interfering with each other.

Now don't think that the text window has to go on the left side of the screen, or from top to bottom. It can be any rectangular portion of the screen.

Try:

VDU 28,7,20,12,11

which sets up the text window in Figure III. (Notice that you are still in the old text window as you type this – it doubles back on you.)

Now type:

CLG

which should clear the whole display, since the graphics area hasn't been restricted. Then type:

CLS

The text window shown in Figure III should appear.

Try typing a few words in here and see what happens. This proves that:

- You can have a text window anywhere on the screen.
- Redefining a text window (that is using VDU 28 twice) automatically destroys the old one, although it doesn't clear it.

Now type:

VDU 26
CLS

Hopefully the whole screen will turn red. The effect of VDU 26 is to restore the text and graphics windows to the state they were in when you switched on – totally overlapping.

Program I illustrates the use of the simple TAB( ) function in a text window. Line 30 sets up a text window identical to the one we last used. 40 to 70 form a loop attempting to print an asterisk in all positions from TAB(0) to TAB(31). The A$=GET$ in line 60 is simply to step you through each printing, as you have to press a key before the program continues. Line 90 returns the screen to normal.

```
10 REM *** PROGRAM I ***
20 MODE 5
30 VDU 28,7,20,12,11
40 FOR I=0 TO 31
50 PRINT TAB(I)"*"
60 A$=GET$
70 NEXT I
80 A$=GET$
90 CLS:VDU 26
```

Program I

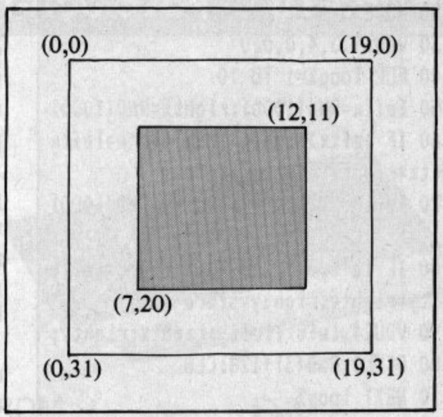

Figure III

It should be immediately apparent that the zero position as far as TAB( ) is concerned is at the left of the new text window, TAB(1) is next to that and so on.

Since the text window is only six characters wide (columns 7 to 12 on the original display, 0-5 on our text screen), TAB(6) will be a complete line across the text screen plus one column. That is, the asterisk will appear to miss a line. Similarly, TAB(7) is a complete line plus two characters and so on.

```
10 REM *** PROGRAM II ***
20 MODE 5
30 FOR I=1 TO 255
40 PRINT TAB(I)"*"
45 A$=GET$
50 NEXT I
```

Program II

```
10 REM *** PROGRAM III ***
20 MODE 5
30 VDU 28,7,20,12,11
40 FOR I=0 TO 31
50 PRINT TAB(I,I)"*"
60 A$=GET$
70 NEXT I
80 A$=GET$
90 CLS:VDU 26
```

Program III

This wraparound effect is exactly what happens with large values of TAB( ) on the original text screen. Program II demonstrates this.

The main point is that in a text window TAB(0) is the left hand column of that window and TAB( ) only considers the width of the text screen in its workings.

Much the same thing happens with the "multiple" TAB( ) such as TAB (3,4). TAB(0,0) is at the top left of the text window. However, unlike the simple TAB( ), if the number in the brackets exceeds the size of the window, this multiple TAB( ) ceases to work. (It also collapses in this way when you go out of bounds on the normal screen.) Program III illustrates the point.

Experiment with setting up your own text screens. See if COLOUR works normally. What happens when text and graphics overlap? Do they overwrite each other? What exactly happens when scrolling occurs? What effect does getting your co-ordinates mixed up and using the top right corner instead of the bottom left have, as in:

VDU 28,12,12,7,20

Just as we can define a text window on the screen, so we can define a graphics window. That is, we can restrict the area where our graphics commands apply to a rectangle within the whole screen.

We use VDU 24 to do this, followed by the co-ordinates of the bottom left corner of the window and the top right hand corner. Of course, we now use the co-ordinates of the graphics screen not the text screen.

To define the graphics window shown in Figure IV we use:

VDU 24,200;300;1000;800;

Notice that while we use a comma to separate the VDU 24 from the list of co-ordinates, after that each coordinate is followed by a semi-colon (;). Also there is a final semi-colon – if you omit this your programs will crash.

Now enter:

MODE 5

then:

VDU 24,200;300;1000;800;
COLOUR 129
GCOL 0,130

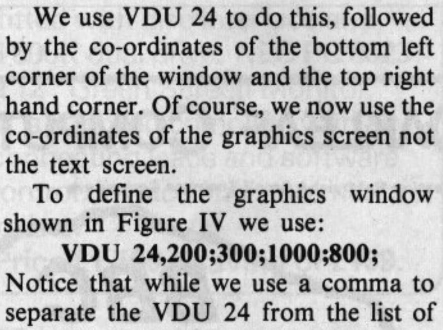

Figure IV

From Page 63

Now try:

CLS
CLG

alternately until you get the hand of things. Nice, isn't it!

Notice how clearing the text screen also clears the graphics area to the text background colour. This is because the text window still occupies the whole screen, so when you clear it the graphics screen, which also overlaps it, suffers the same fate.

Similarly, text gets printed across the graphics area.

The only way to avoid this problem is to define two entirely separate text and screen areas.

Now, with the graphics screen as defined above, try:

MOVE 0,0
DRAW 1000,1000

You'll see that only the part of the line that crosses the graphics window appears – you really have a "window" onto part of the original graphics screen.

So (0,0) is still where it was on the graphics screen, as is (1000,1000).

```
   10 REM *** PROGRAM IV ***
   20 MODE 5
   30 VDU19,3,4,0,0,0
   40 FOR loop%=1 TO 10
   50 leftx=RND(1000):rightx=RND(1000)
   60 IF leftx>rightx THEN store=leftx
:leftx=rightx:rightx=store
   70 lefty=RND(1000):righty=RND(1000)

   80 IF lefty>righty THEN store=lefty
:lefty=righty:righty=store
   90 VDU24,leftx;lefty;rightx;righty;
  100 GCOL0,RND(3)+128:CLG
  110 NEXT loop%
```

Program IV

Having a graphics window does not automatically move (0,0) to the bottom left of that window.

The only graphic effects you will see from your graphic commands will be those that occur within the region of your graphics window.

Try drawing a few triangles with parts outside the graphics windows to see what I mean.

Just as with text windows, defining a new graphics window immediately cancels the old one (without clearing it from the screen). Also VDU 26 still has the effect of restoring the text and graphics areas to their original extent.

We can use the idea of defining graphics windows to draw rectangles on the screen rapidly. We just define a graphics window where we want the rectangle, then clear to the appropriate background colour.

Program IV illustrates the techniques, by printing out ten random rectangles on the screen.

Finally, how about writing a simple program for children? Define a graphics window in the top two-thirds of the screen and a text window on the bottom third. Try not to let them overlap.

Then draw a house piece by piece in the graphics screen. Each time you press a key another bit appears. As each part appears, make sure that the name of that part is printed on the text screen.

If you can manage that, you are well on the way to mastering graphics!

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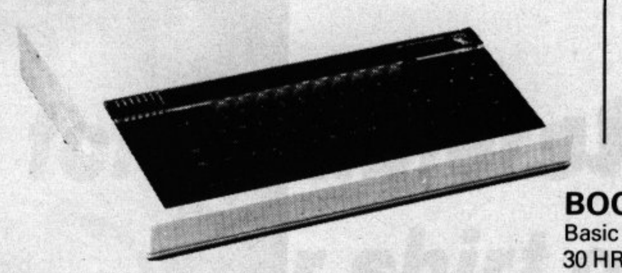

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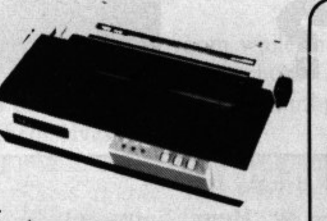

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So you want to be Premier?

Great Britain Ltd (Simon W. Hessel Software)

I NEVER thought that I could have much fellow feeling with Margaret Hilda Thatcher, but after playing Simon Hessel's brilliant new game Great Britain Ltd, I must admit to more than a touch of sympathy.

It's not simple running a country, take my word for it. If you've ever sat in front of a TV on Budget Day thinking how easy it is, and how much better you could do it, then try this game.

The idea is that, as Prime Minister (of the party of your choice), you have to guide your country through its social and economic ills for five years, then put yourself up for re-election.

At the beginning of the period you are shown a display of the major economic indicators such as inflation rate, unemployment rate, exchange rate and, ominously, your popularity rating.

You also get a display of what you receive by way of taxes and what you spend.

For each of the five years that you're in office you have a Budget Day. Using the economic indicators as guides you can change the taxes (but watch the inflation rate and unemployment figures), be as generous as you like with social benefits (but beware budget deficits) and start such things as housing projects (but keep an eye on everything!).

It's absolutely fascinating to play and, while it is easy to understand with excellent instructions, it is far more than just a trivial mimicry of reality.

You really do get involved, especially when you get news flashes of rioting in the streets!

The decision-making process can get both involved and agonising. You don't get the super fast, technicolour graphic wonders of other games, but you do get thoughtfully laid out, easily understood displays of economic information.

Great Britain Ltd is easily as exciting, and certainly more satisfying, than any game of Space Invaders I've played.

And at the end of five years worrying about the country what do you get as a reward? The chance to write your own manifesto and fight an election!

Try it, it's fascinating. Watch yourself become the type of political animal we all know and hate. Resist the election year give-away budget if you can and see how much you promise in your manifesto compared with what you do in office.

As for me, well, I've learnt how hard it is to run even a micro-country. I've never once been re-elected but despite that I know my policies are sound and I'll stick to them when I play the game again. After all, there is no alternative...

Steven More

Package 004 (Software Invasion)

TEXTPRO

THIS simple text editor written in Basic uses text Mode 3 with black letters on a yellow background.

This mode is difficult enough to see on a monochrome TV, and near impossible on a colour one.

It can only handle a maximum of 60 lines of text, which might suffice for letters but not for War and Peace.

The function keys are used to enter commands. The program is supplied with a "command strip" which is placed under the clear plastic bar next to function keys to act at a prompt.

This is one practice which I hope becomes much more widespread.

The commands available allow you to LOAD and SAVE the text, JUSTIFY, INSERT and DELETE a line, PRINT and move text up and down.

BLACKJACK

THIS tape version of the well known card game is written mainly in Basic, with one machine code call.

The cards displayed by the program are very realistic indeed, especially the Royal cards.

It is a pity that the game is rather disappointing. This is partly due to the inherent limitations of the game itself, and partly to the lack of variation in the computer's responses.

This version will not run on a disc

Good for gamblers? Bet your shirt on it!

Inheritance (Simon W. Hessel Software)

HAVE you ever wondered what you'd do if you came into some money? Would you be able to invest it and watch it grow, or maybe start a small business and become a millionaire?

With Inheritance you have the chance to find out.

It's a game in two parts, the idea being that you have been left your Great Uncle Arbuthnot's whole estate. But first you have to prove you are worthy of the inheritance by turning £10,000 of it into £100,000 by investing in the stock market, the metal market and, if you're desperate, gambling on horses or cards.

As if that's not enough, you also have to avoid your scheming relatives who'll be trying to thwart you.

I must admit that before I'd played the game I thought that investing might be boring. No way! In fact, I might just buy a copy of the Financial Times tomorrow: I've discovered myself muttering about "market trends in platignum" and insisting beneath my breath that "retailers are underpriced!"

And when I took a chance on a rank outsider because I was short of money, I had to leave the room while the race was run! Incidentally the horse racing and blackjack gambles are mini-games in themselves.

If you manage to run the gauntlet of the shares market and your relatives, you graduate to the second part of the game where you use your business skills to turn the £100,000 into £1,000,000 by investing it in the estate's soft drinks factory.

But first you have to find the recipe for Paradise Cola which uncle A. has hidded, then treat with a native chief for the raw material of the drink.

Only then do you get round to actually running the factory, deciding how much to make at what price and fixing the advertising strategy to conform with market conditions.

It's not easy, but it is fun.

A great game, really two games for the price of one. Again Simon Hessel has used tabular information (combined with clever applications of the BBC Micro's sound and graphics facilities) to produce an interesting, intelligent and enjoyable game.

The only trouble is that there is no way to hold a stewards' inquiry into that last race where I lost all I had in a desperate attempt to make the £100,000.

It was a fix. I'm sure it was those scheming relations.

And have you seen the price of raw materials nowadays? It's enough to make you cry.

And that Chief Imbango, don't talk to me about the exploited Third World ... **David Carr**

system without being moved down in memory, as Mode 1 is used to draw the cards on the screen. If only the rest of the game had matched the card display!

DISASSEMBLER

THIS is a very simple disassembler written in Basic. Apart from using the function keys and having a "command strip", there is nothing special about it. There are more useful disassemblers, having more features, listed in computer magazines.

The vendors describe these programs as one of "four brilliant new software tapes". That is greatly overstating the case for this tape.

Challenge for starship captains

Countdown to Doom (Acornsoft)

THIS adventure is set on an alien planet where your spaceship has crash-landed. The aim is to collect various pieces of equipment necessary to repair the ship, thereby escaping from the planet before your craft collapses in face of unspecified hazards.

The alien territory consists of deserts, swamps, volcanoes, forests, cities and glaciers, and the gaming landscape is diverse and imaginative. However the close proximity of two opposite climates – glaciers and swamps – does tend to stretch credibility.

The game starts on the bridge of your fast disintegrating star-voyager. You are faced with some explosives and a jammed door.

After you have navigated around this obstacle, you meet such things as a poor, defenceless(!) cute little blob of roving jelly, a rather obliging sandworm and a 500 toothed, three headed monster, with a taste for starship captains!

The many strange puzzles that cross your path will keep you occupied for many frustrating days.

The vocabulary is extensive and includes words that are not of direct use in

→

From Page 67

the adventure, such as swim, sit and eat. This quirk is used to provide a touch of "alien" humour when the desperate adventurer tries anything to survive.

Thus, when attempting to wave an object, I was told: "This isn't a fantasy game, you know. Doing that won't help!"

Abbreviation of direction commands can be used, like NE, S, W, etc. This cuts the tedium of typing in "Go northwest" perpetually in maze situations.

There is also a save game facility which is a great boon, especially when you are progressing well and a voice screams: "It's time for your dinner!"

Countdown To Doom is a real challenge for any adventurer, beginner or expert, and will provide months of entertainment before you can successfully lift-off in your ship. The story line makes an enjoyable change from the standard adventure format.

At £9.95 it provides the usual Acornsoft value for money and, though not as technically proficient, it is almost on a par with Dungeon Adventure.

Chris Roberts

First impressions were fading fast..

Commercial Accounts (Gemini Marketing)

ONCE every three months I go through a nightmare. All the cheques I have sent or accepted, all the tatty little receipts for purchases or services received, have to be sorted, numbered, listed, added, explained and merged into an intelligible set of books that will satisfy the taxman, persuade various clients to pay for my services and, above all, give me a clear picture of whether my one-man, self-employed business is surviving.

One day earlier this year I switched off my calculator in despair after eight hours of failure to find a missing £100, and sent Gemini Marketing a cheque for £23.95 for their Commercial Accounts package on disc.

I had acquired my BBC Micro only a few days before and had never used a computer until then. I wistfully considered Gemini's Cashbook program but concluded I dare not risk £95 on an unseen product.

The disc arrived ten days later – I felt they could have been quicker – and it was accompanied by a brief User Guide which unfortunately referred only to tape cassettes.

However it proved to be a simple, crisp and friendly program, with the clarity my pen and paper book-keeping lacks.

The user selects from concise menus the type of transaction – either cheque receipt or payment for credit or on-the-spot purchase or sale.

The transaction is input as a few brief answers to short prompts from the screen. The program lists these either as a journal or by individual account.

It will also summarise the state of the bank balance, the history of the year, month by month and the VAT record. Procedures to save and retrieve information from disc or to print are simple and clear.

Sadly this first, favourable impression evaporated when I got down to work. I do not pay VAT because my turnover is below the threshold, so I was irritated to answer a VAT question – admittedly with a single keystroke – for every transaction.

I would have liked to say "No VAT" at the start and not be pestered thereafter.

For tax reasons my financial year starts on May 1. Dates, however, are input with a month number. Instead of requiring the user to construct a numbered tax month calendar the program should input MAR or APR and either use these throughout or else convert them to the correct position in the user's personal financial year – in my case 11 or 12.

The program makes no attempt to sort transactions by date. For lazy people like me who stockpile chits for three months, but still need to present accounts in date order, such a facility is essential.

Input of a cheque receipt duly cancels the outstanding debt but does not credit the bank account. A separate input is needed for this.

Could not "Have you paid it in? Y/N" be added to do both jobs with one input?

The journal described my transactions with a number so I had to repeatedly consult the menu to discover whether "5" signified "cheque payment for a credit purchase" or something else. No doubt, one would learn in the long run, but initially it was irritating.

In particular I grieved that the 12 characters available to input the account name were abbreviated to a mere five on the journal display because this prevented me "bending" the system to overcome its worst fault of all. It caters for only one profit centre, operating one single bank account and provides no analysed management information.

There may be minute businesses for whom this could be an adequate book-keeping system, but it should not be described as producing accounts.

Most businesses however, even small ones, need costs and income to be sorted and allocated to profit centres and need to differentiate between expenditure which is tax-deductible and that which is not. For such people this program is quite inadequate.

Victor Seymour

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The BBC Micro User Show is primarily designed for people who already own a BBC Micro, and they will find it a veritable Aladdin's cave, packed with goodies that will help them make their computing even more rewarding.

But there will also be much to interest anyone about to buy their first machine. They will be able to discover for themselves what computing is all about – and how easy it really is.

Visitors will be able to ask all the questions they want about the vast range of accessories on show, from tiny program chips and memory expansion devices to disc drives, monitors, modems and the many other ways of linking the BBC Micro to the outside world.

This is an event no user of the BBC Micro will want to miss. So make a note of the date in your diary now. More details of our plans will be given in next month's BBC Micro User.

Meet BBC Micro experts at our WALK-IN FORUM

LECTURE theatres adjoining the two exhibition halls will be in use throughout the three days of the Show, with leading authorities on the BBC Micro explaining in easy-to-understand language the latest developments in BBC computing.

On Friday there will be special sessions on practical applications of the micro in education and business.

On Saturday and Sunday more well-informed speakers will be discussing subjects ranging from Basic for beginners, the use of discs and exploring the BBC's ROM to tackling assembler language and demonstrating advanced techniques in BBC graphics.

When it's open, and what it costs

EXHIBITION

Friday, June 24 – 9.30am-7pm
Saturday, June 25 – 9.30am-5pm
Sunday, June 26 – 9.30am-4pm
Adults: £1.50 Under-12: £1
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WALK-IN FORUM

Two-hour sessions each morning and afternoon
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2pm-4pm
Admission per session: £1

Why Manchester?

IT was at Manchester University that computing as we know it today was born. So it is only just that the first national show devoted exclusively to the all-British BBC Micro should make its debut in the city that spearheaded the computer revolution.

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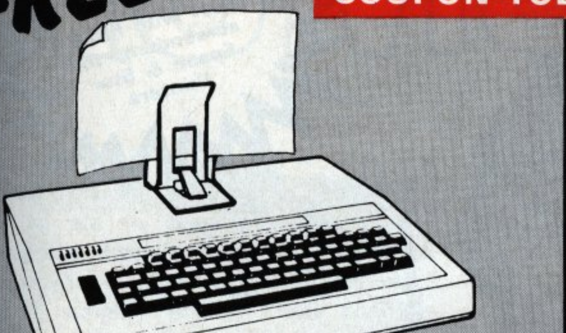

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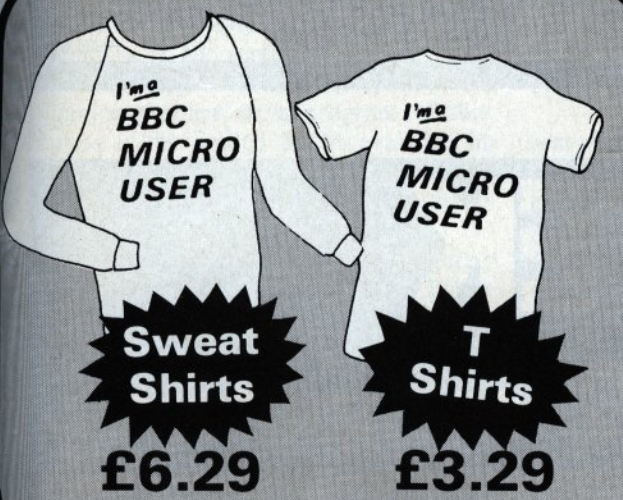
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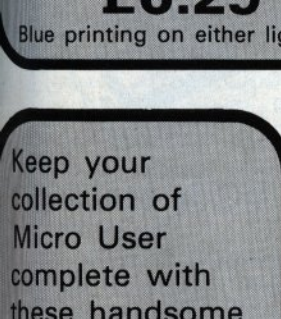

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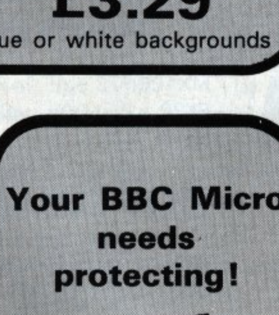

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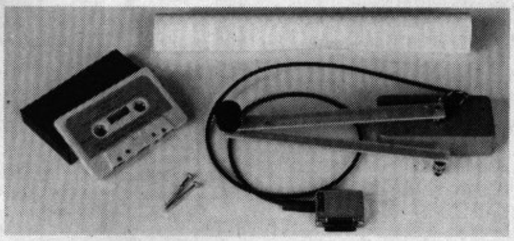

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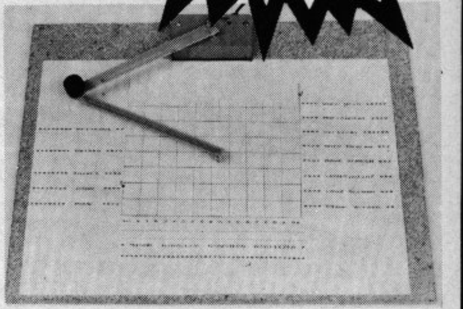

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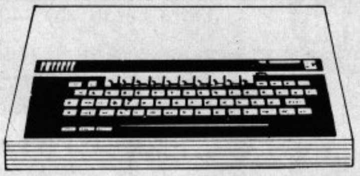

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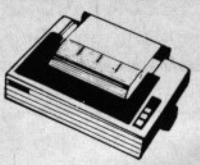

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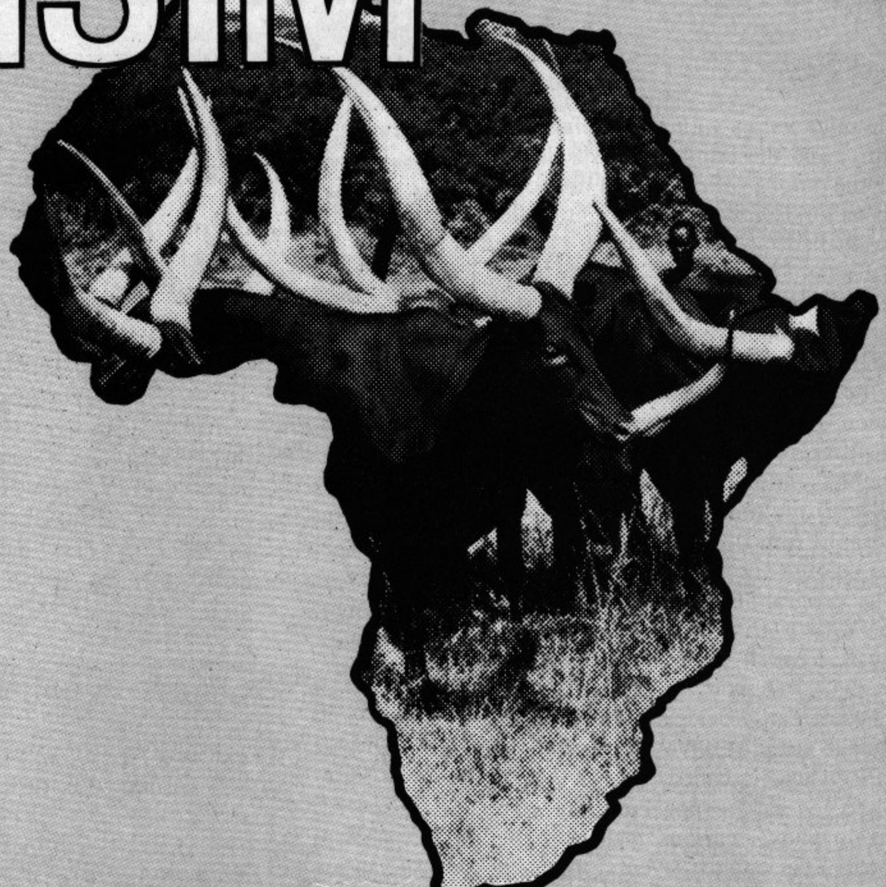
NOMSIM



THIS program was designed primarily as an aid to geography classroom teaching. For a number of years geographers have used simulations which simplify reality. These enable children to work out for themselves important inter-relationships.

But even after careful design many simulations are still complex and take a considerable time to work through. Also the geography can be hidden in a mass of operational detail. Using a microcomputer both simplifies and speeds up the activity.

The starting point of Nomsim was an interest in the savanna grasslands of Africa and the associated nomadic herding. The economy is affected by many factors and it was necessary to isolate some of the major ones.

MODE 1 was chosen as it has a very readable text style and size, allows four colours on the screen at any one time, and has high resolution graphics. The major problem in a program of this type is the limited RAM available in this mode.

The most important elements are:

PROCra

Choose an annual rainfall weighted to favour the range 500-999mm. These areas experience only occasional very wet or dry years.

PROOch

An area must be chosen in which to spend the dry season. It would have been useful here to draw a more detailed sketch but this program virtually fills the user's Basic program space. The second part of line 540 allows for spelling mistakes after the first two letters and allows the program to run without having to type in the full name of the chosen area.

PROCpa

Rainfall is a major factor determining the pasture available. The different regions vary in their pasture growth and pa$ carries a comment on the pasture quality.

PROCv

A graphics window is drawn using VDU 24. In it a simple diagram is produced to illustrate the response of pasture to the rainfall. VDU 5 separates the graphics and text cursors and allows text to be printed at the graphics cursor. VDU 4 rejoins the cursors and VDU 26 returns the graphics window to its initial value. CHR$X% carries the vegetation character (derived from PROCpa). For example, 228 is tall grass.

These characters are defined at the start of the program using VDU 23. Note how X% is controlled through pa in PROCpa. For example PROCpl will not allow tall grass on the plateau despite the rainfall total.

PROChe

The herd size is initially set at 80 in line 60. Here its increase or decrease is calculated. The two lowest rainfall totals produce a decrease in size as the pasture is poor. Line 1240 redefines COLOUR 0 to be COLOUR 15 from the palette, flashing black and white. Line 1250 changes the background colour to yellow and on it are printed characters suggesting cattle. The number printed corresponds to the herd size. A detailed status report is given using r$,a$ and he.

PROCts

The nomadic herders face the problem of the tsetse fly. CHR$231 to CHR$240 produce the different elements of a fly-like figure – hopefully a little menacing when drawn in black on a red background. Line 1420 combines the various elements as the array T$ and the loop in line 1430 puts them together. A number are printed on the screen equivalent to the intensity of the problem, a REPEAT – UNTIL loop controlling this number.

The group of procedures which follow calculate the effects of the tsetse fly. These vary from area to area and are affected by the rainfall.

PROCc

Here certain chance factors are brought into play. Memory size limits the number available and each are given an equal opportunity of happening. There are certain safeguards. Floods can only occur on the floodplain. If the number of people in the family falls below three PROCson is ignored. In PROCTsinoc a flag is carried (ino=1) to signal in PROCts that this factor no longer has any affect.

PROCmk

This procedure calculates the number of cattle needed to be sold. The

→

By NORMAN PARR and GARETH PROUD

Nomsim listing

From Page 75

cattle price varies with the rainfall and pasture, and the family size will determine the number of cattle that are sold. This factor is much more complex in reality.

PROCsum

A graph is drawn to summarise the herd size each year. Numbers are plotted to a maximum of 200 but this may be easily changed. 2%(I%) is the position of the * along the X axis, 160 is the Y axis position of the graph base which has added to it H%(I%) (the herd size) multiplied by 3.75 to scale the graph from 0 to 200. GCOL0,1 in 2480 colours the * red.

The program is contained within a loop Y%=1 to 10 to run for the equivalent of 10 years. At the end of each year a test is made to check if the number of cattle per person has fallen below the critial survival value of 10. If so, PROCend is called up.

The general arrangement of the program allows various factors to be altered. The chance events may be changed and/or weighted, the characters may be redefined and the graph re-scaled, for example alter line 2410 to no=no+10 and alter the scaling factor in line 2480 to 7.5 to give a graph scaled from 0 to 100.

If a memory expansion were available more factors could be included and other inter-relationships explored. The simulation would then more nearly approach reality.

```
   10 MODE1
   20 *TV255,1
   30 VDU23;8202;0;0;0;
   40 VDU23,224,32,32,32,224,63,63,17,17
:VDU23,225,60,66,129,66,36,24,24,24:VDU2
3,226,16,16,16,16,146,146,146,146:VDU23,
227,0,0,0,0,0,0,130,146:VDU23,228,146,14
6,146,146,146,146,146,146
   50 VDU23,230,24,24,24,24,24,24,24,24
   60 X%=0:he=80:DIMTS$(5):ino=0:s=0:pe=
4:DIMH%(10):DIMZ%(10):Z=185
   70 COLOUR130:CLS
   80 COLOUR0:PRINTTAB(9,10)"PASTORAL NO
MADISM"
   90 PRINTTAB(15,12)"ON THE"
  100 PRINTTAB(10,14)"AFRICAN SAVANNAS"
  110 COLOUR1:PRINTTAB(8,18)"by N.Parr a
nd G.Proud"
  120 PROCsp
  130 CLS:PRINT''"You are a member of th
e Bororo or CattleFulani"
  140 PRINT'"The more cattle you have th
e wealthier  you are"
  150 PRINT'"The wet season is spent on
the plateau  grazing your herd":PRINT'"Y
ou must choose an area in which to     s
pend the dry season"
  160 PRINT'"You must keep 10 cattle for
 each member of your family":PRINT'"At t
he start your family has 4 people   and
you have 80 cattle"
  170 PROCsp
  180 FORY%=1TO10
  190 PROCra
  200 PROCsp:VDU20:CLS
  210 PROCar:PROCch
  220 PROCsp:CLS
  230 PROCpa
  240 PROCpas
  250 PROCsp
  260 PROCv
  270 PROCsp:VDU20
  280 PROChe
  290 PROCsp:VDU20
  300 PROCts:PROCsp
  310 CLS:PROCc
  320 PROCsp:CLS
  330 PROCmk
  340 PROCsp
  350 IFhe>200he=200
  360 H%(Y%)=he
  370 PROCsum
  380 PROCsp
  390 IFhe/pe<10THENPROCend
  400 NEXTY%
  410 END
  420 DEFPROCar
  430 COLOUR131:CLS
  440 GCOL0,0:MOVE1000,800:DRAW750,800:D
RAW500,650:DRAW250,650
  450 DRAW50,850:DRAW300,850:MOVE500,650
:DRAW300,850
  460 MOVE750,800:DRAW550,1000:DRAW300,8
50:MOVE1000,800:DRAW800,1000:DRAW550,100
0
  470 COLOUR1:PRINTTAB(25,7)"^":PRINTTAB
(25,8)"¦":PRINTTAB(25,10)"PLATEAU"
  480 PRINTTAB(20,10)"¦":PRINTTAB(20,9)"
^":PRINTTAB(20,12)"FOOTHILLS"
  490 PRINTTAB(12,12)"^":PRINTTAB(12,13)
"¦":PRINTTAB(12,14)"FLOODPLAIN"
  500 ENDPROC
  510 DEFPROCch
  520 PRINT''"WHICH AREA ARE YOU GOING T
O USE?"
  530 PRINT''"TYPE in name of area chose
n":PRINT''"Press RETURN key afterwards"
  540 INPUTarea$:ar$=LEFT$(area$,2)
  550 IFar$<>"FL"ANDar$<>"FO"ANDar$<>"PL
"THEN530
  560 ENDPROC
  570 DEFPROCra
  580 P%=RND(99)
  590 IFP%<11r=0
  600 IFP%>10ANDP%<26r=1
  610 IFP%>25ANDP%<47r=2
  620 IFP%>46ANDP%<68r=3
  630 IFP%>67ANDP%<86r=4
  640 IFP%>85r=5
  650 IFr=0r$="<250mm"
  660 IFr=1r$="250-499mm"
  670 IFr=2r$="500-749mm"
  680 IFr=3r$="750-999mm"
  690 IFr=4r$="1000-1249mm"
  700 IFr=5r$="1250+mm"
  710 COLOUR130:CLS:COLOUR0:PRINTTAB(5,1
0)"RAIN FOR YEAR ";Y%" is "r$
  720 IFr=0THENPRINT''"THIS IS VERY LOW
 - TROUBLE AHEAD"
  730 IFr=1PRINT''"THIS IS LOW  - POSSIB
LE TROUBLE - UNLESS"'"YOU ARE ON THE FLO
ODPLAIN"
  740 IFr=2THENPRINT''"WITH THE HIGH DRY
 SEASON TEMPERATURES":PRINT'"THIS IS STI
LL RATHER LOW"
  750 IFr>2ANDr<5THENPRINT''"THIS RAINFA
LL WILL ALLOW YOU TO SURVIVE"
  760 IFr=5THENPRINT''"THIS IS A HIGH RA
INFALL TOTAL"
  770 PRINT'"You must now choose a dry s
eason area":PRINT'"This must be in one o
f three regions"
  780 ENDPROC
  790 DEFPROCpa
  800 IFar$="PL"PROCpl
  810 IFar$="FO"PROCfo
  820 IFar$="FL"PROCfl
  830 IFpa<2X%=227
  840 IFpa>1ANDpa<4X%=226
  850 IFpa>3X%=228
  860 ENDPROC
  870 DEFPROCpl
  880 pa=r:IFr>3pa=3
  890 ENDPROC
  900 DEFPROCfo
  910 IFr=0ORr=1pa=1 ELSEpa=r
  920 IFr=5 pa=4
  930 ENDPROC
  940 DEFPROCfl
  950 IFr<3pa=3ELSEpa=4
  960 ENDPROC
  970 DEFPROCpas
  980 COLOUR1
  990 IFpa=0pa$="vitually non-existant.
Water supplies will also be a problem."
 1000 IFpa=1pa$="very poor. The cattle w
ill have to be   driven long distances t
o find food and  water."
```

Turn to Page 94

Make sure your collection is complete!

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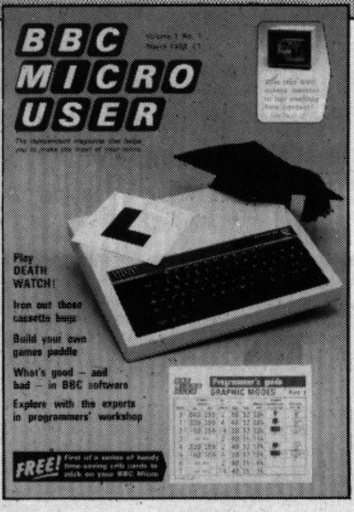
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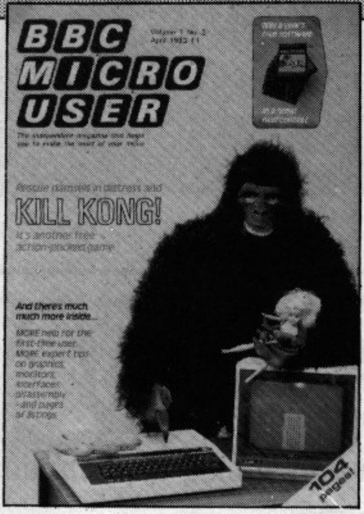
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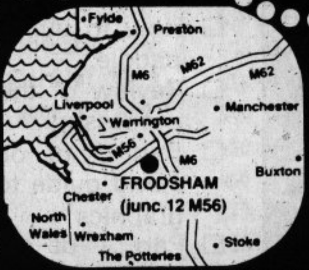

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THE BEEB BODY BUILDING COURSE

EXERCISE Nº4

By MIKE COOK

I have often pondered upon the workings of the female mind but always come to the same conclusion – it is better to stick to simple things like designing computers! However, it was just this stimulus that started this month's exercise. Let me elaborate.

Consider this question: What makes a wife, mother and trained psychologist suddenly have a desire to take up geomorphology? Well I don't know and quite honestly I don't wish to, but given the fact what can one do to help?

Geomorphology is the study of the effects of the underlying geology on the landscape. "Wouldn't it be great," said my wife, "if your computer could plot a sectional profile of Pendle Hill?" (A local, very large, lump of rock.)

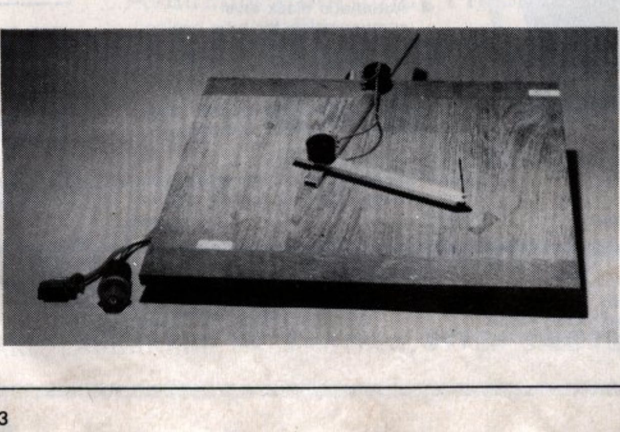
"Nothing to it," I said, "once the data is in the machine." And there, as they say, is the rub. What is needed is a device known as a "graphics digitiser tablet". With it I could trace round the outline of each contour on the map and build up a data base of the shape of the hill.

Unfortunately these digitisers cost slightly more than my entire computer system and are way outside my budget. However a home brew set up can be made for less than £7 if you go about it in the right way, which, without further ado, I shall show you now . . .

A digitiser tablet is a device that will input the X and Y co-ordinates of a pointer into a computer. As the pointer is moved around the active area of the digitiser, a stream of information is fed back to the computer.

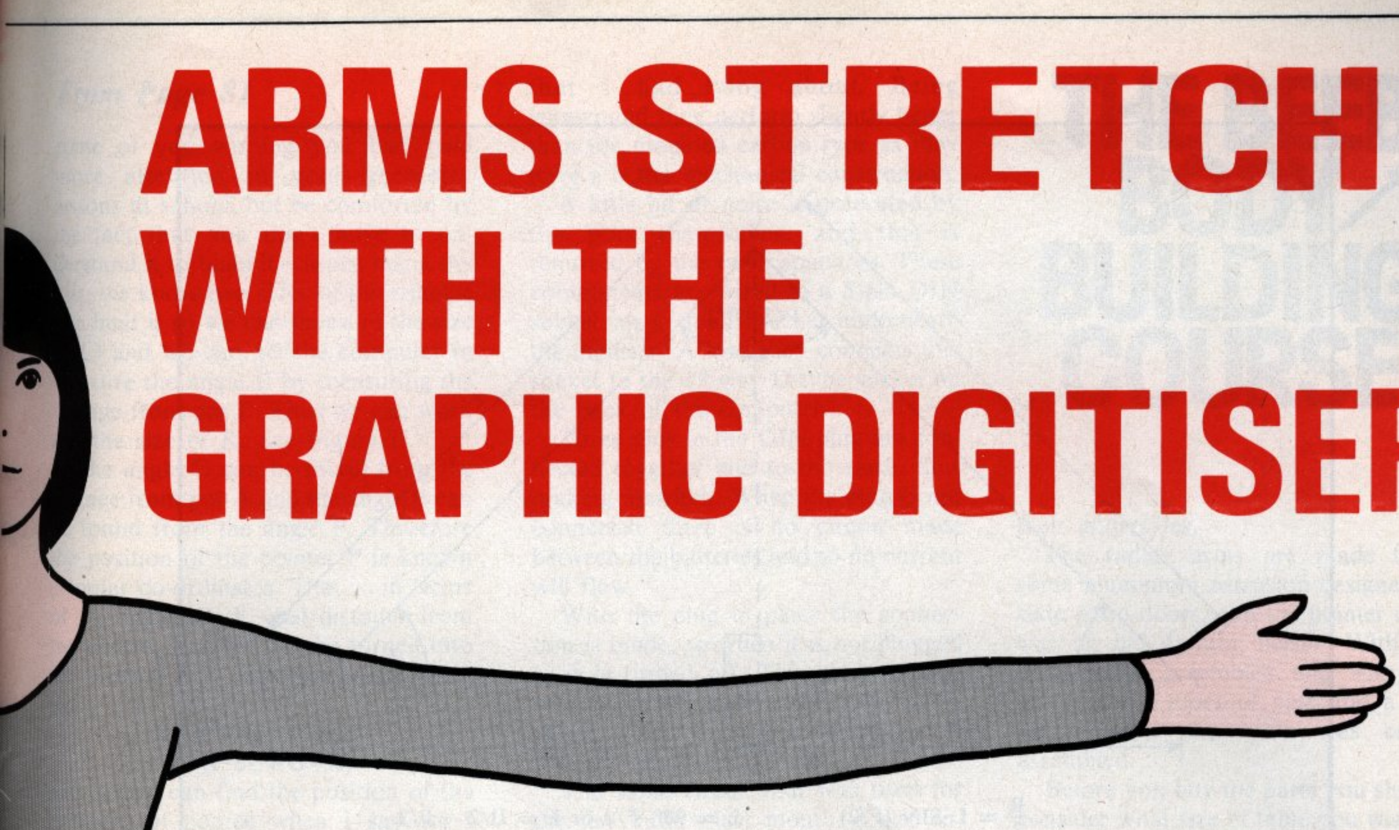
There are many different principles on which they can work, but most connect the pointer to the positional-sensing electronics by a wire. However, if you are willing to make the compromise of mechanically attaching your pointer to the table then things become much more feasible for an amateur constructor.

The type of digitiser I am describing



The radius arm digitiser . . . simple to make, but effective

ARMS STRETCH WITH THE GRAPHIC DIGITISER



is known as a "radius arm digitiser" and is quite simple to build. In fact, the electronic parts are essentially no different than last month's joystick. The difference lies in how we physically link them and the software used to drive the device.

The device is shown in the photograph and consists of two pots (potentiometers) connected together by a radius arm, the second pot being attached by another arm to a pointer.

To see the principle of operation consider Figure I. A and B are the two pots with the two equally sized radius arms labelled L attached to them. There is an imaginary line R (shown dotted) joining the pointer (marked P) and the first pot A, thus forming a triangle.

At this point I am sure there are

→

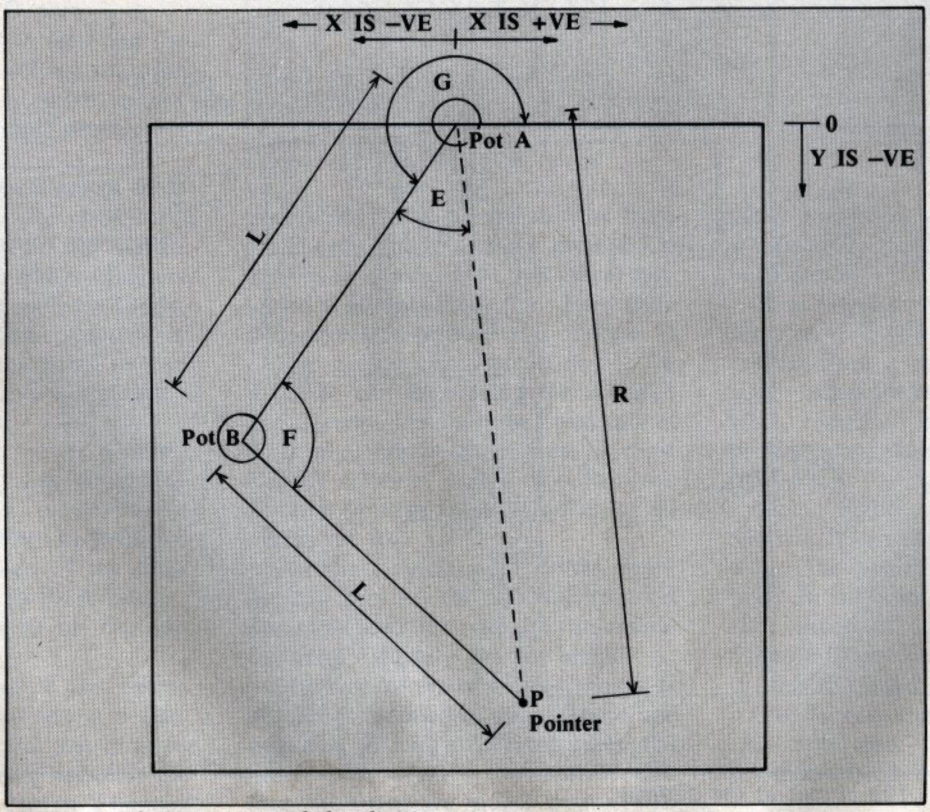


Figure I. The geometry of the digitiser

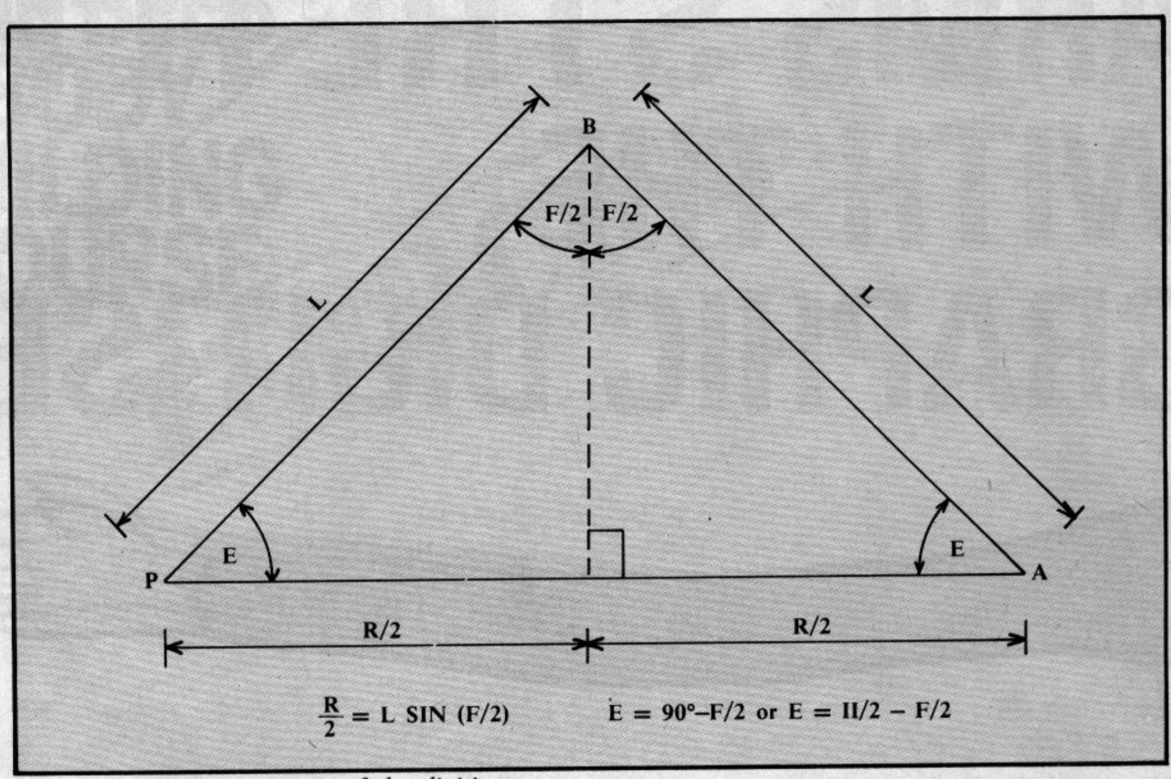

B
F/2
F/2
L
L
E
E
P
A
R/2
R/2
R/2 = L SIN (F/2)
E = 90°–F/2 or E = II/2 – F/2

Figure II. The trigonometry of the digitiser

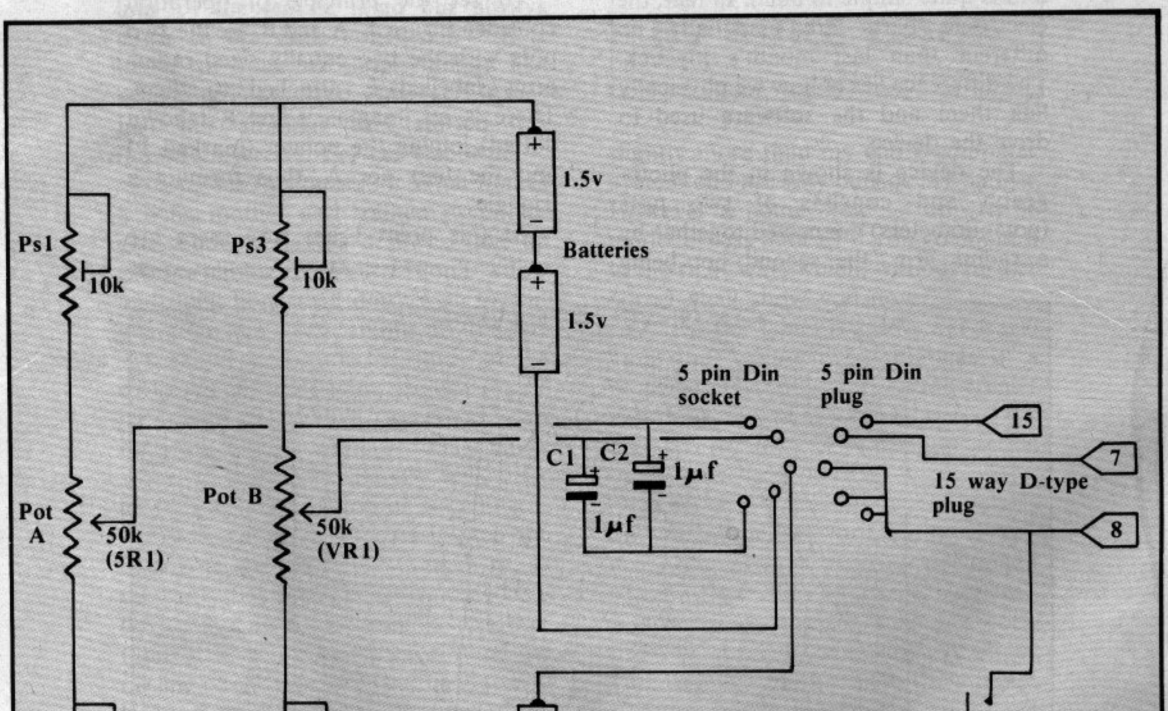

1.5v
Batteries
1.5v
Ps1
10k
Ps3
10k
5 pin Din socket
5 pin Din plug
15
7
C1
C2
1μf
1μf
Pot A
50k (5R1)
Pot B
50k (VR1)
15 way D-type plug
8
Ps2
10k
Ps4
10k
1.5v
Batteries
1.5v
13
Push to make switch

Figure III. The circuit of the digitiser

THE BEEB BODY BUILDING COURSE

From Page 81

some of you wishing you had paid more attention in your geometry lessons at school, but be comforted by the fact that you don't have to understand it to build it – it just helps. As it is, we know two sides of the triangle (we built it so we can measure the size of L) and we can get the computer to measure the angle F by measuring the voltage from pot B. Thus we can work out the size of R. See Figure II.

The angle G can be found from the voltage from pot A and the angle E can be found from the angle F. Therefore the position of the pointer P is known in polar co-ordinates. That is, in terms of an angle, G+E, and distance from the centre, R. This can be turned into the normal X,Y cartesian co-ordinates by:

X=R*COS (G+E)
Y=R*SIN(G+E)

and so we can find the position of the pointer. Of course when I say we I really mean the computer, because it is quite good at sums.

Let us now consider the electrical circuit shown in Figure III. It is somewhat more complex then last month's joystick because we want to squeeze every bit of accuracy we can from the A/D port in the computer.

When the pointer is moved over the active area each of the two pots A and B will only move through a small angle. To achieve the maximum accuracy we must make this small angle produce the full range into the A/D port.

To do this we need to feed into the pot not only a larger voltage than the maximum but also a negative voltage to pull the minimum output down close to zero.

These voltages are derived from batteries so that they are electrically quiet and add no noise to our signal.

You can get plastic battery holders for four AA size batteries from Tandy, and with a little judicious snipping of the wires linking the batteries we can convert them to have the configuration required in the circuit.

At the end of each pot is a preset variable resistor, and they should be adjusted using a small screwdriver so that a full scale signal can be provided over the working range of the pots. These can be replaced by fixed resistors if you want to use a bit of trial and error.

Any value of pot may be used as this works using a potential divider action, the only stipulation is that they must be linear, as the linearity affects the accuracy of the final digitiser. I happen to have used two 50k wirewound pots that I had lying about. Being wirewound they perform slightly better than the moulded carbon type as they have a better mechanical construction.

A little bit of noise is generated by the pots themselves, and this is removed by the two capacitors. These components are wired to a 5-pin DIN socket on a small bracket underneath the digitiser. A lead then connects this socket to the 15-way D-type socket on the back of the computer.

Three pins in the DIN plug are connected together and to the earth, thus making a switch. When the plug is not connected there is no circuit made between the batteries and so no current will flow.

With the plug in place the connection is made, so when it is not plugged in it is turned off. This saves money and is much better than having a switch which you will tend to forget if you are anything like me.

The same circuit that was used for the fire button last month is also included, and, although not essential to the operation of the digitiser, makes its use easier. I used a separate wire from the D-type plug to a button mounted in a circular plastic box that once contained a 35mm colour film. This made it comfortable to hold and operate.

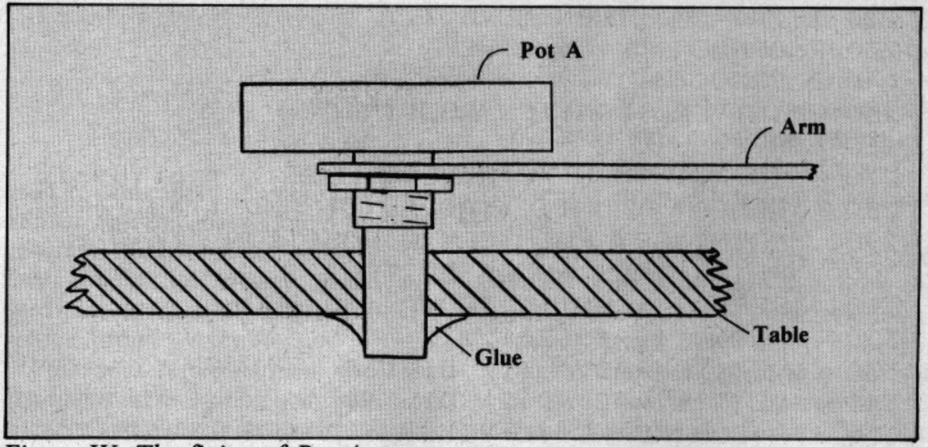


Figure IV. The fixing of Pot A

The mechanical construction of such a device can take many forms. All I can describe here is how I went about it. It may not be the easiest or most elegant solution, and if you feel you could do it some other way then by all means do so.

All the mechanical parts were bought from a local DIY supermarket and were used in a way that the manufacturers definitely did not intend.

The base of the table was bought as a kitchen cupboard door. These are available in many different sizes and are of solid wooden construction. The four short legs are square wooden furniture knobs with pieces of felt glued to their undersides.

The radius arms are made from some aluminium extrusion designed to slide patio doors, and the pointer once was an old darning needle. With the components assembled and with the aid of some tubes of glue and a few simple tools the table was easily assembled.

Before you buy the parts you should consider what size of table you wish to construct. The length of the radius arms determines the overall size of the active region on the table. This region will be split up into about 500 units in both planes.

It is therefore no good making the arms large if you want to input information from a small drawing. I used seven inches for each arm. This gives a slight reduction in size when the co-ordinates are scaled up and plotted on the screen.

You might consider something smaller. It just depends how you want to use the table. For pot A I fixed the body to the arm and the spindle into the baseboard (this can be seen in Figure IV) but you could equally well do this the other way round.

Pot B must have its body fixed to one arm and its spindle fixed to another. I fixed the pointer into the arm

```
 10 MODE 7:*FX16,2
 20 PRINT TAB(0,6),"BBC MICRO USER PRESENTS"
 30 PRINT"The Beeb Body Building Courses"
 40 PRINT"DIGITISER TABLE SKETCH PAD"
 50 PRINT"By Mike Cook"
 60 INPUT"What mode do you want to use ",M%
 70 IF M%>6 OR M%<0 THEN GOTO 60
 80 DIM TH(2,2),VC(2,2),SF(2),TC(2)
 90 PROCcal
100 MODE M%
110 PROCtable
120 X=(X+6)*91
130 Y=(Y+12)*86
140 PROCKEY
150  IF ADVAL(0) AND 1 THEN DRAW X,Y
160 GOTO 110
170 DEFPROCKEY
180 A$=INKEY$(0)
190 IF A$="" THEN 230
200 IF A$="W" THEN CLS
210 IF A$="P" THEN CALL &D10
220 IF A$="M" THEN MOVE X,Y
230 ENDPROC
240 DEFPROCcal
250 PRINT"CALIBRATION ROUTINE"
260 FOR K=1 TO 2
270   IF K=1 THEN XC=8:YC=0 ELSE XC=-6:YC=-12
280   REPEAT : UNTIL (ADVAL(0) AND 1)=0
290   PRINT"SET POINTER TO POSITION ";K
300   PRINT"THEN PRESS BUTTON"
310   REPEAT : UNTIL (ADVAL(0) AND 1)
320   SOUND 1,-10,201,2
330   VC(1,K)=ADVAL(1) DIV 64
340   VC(2,K)=ADVAL(2) DIV 64
350   H=SQR(XC*XC+YC*YC)
360   PH=ATN(YC/XC)
370   IF PH> 0 THEN PH=PI+PH ELSE PH=2*PI+PH
380   TH(2,K)=2*ASN(H/(2*7))
390   TH(1,K)=PH+TH(2,K)/2-PI/2
400   NEXT
410 FOR K=1 TO 2
420   T9=VC(K,1)-VC(K,2)
430   SF(K)=(TH(K,1)-TH(K,2))/T9
440   TC(K)=(VC(K,1)*TH(K,2)-VC(K,2)*TH(K,1))/T9
450   NEXT
460 ENDPROC
470 DEFPROCtable
480 G=SF(1)*(ADVAL(1) DIV 64)+TC(1)
490 F=SF(2)*(ADVAL(2) DIV 64)+TC(2)
500 GE=PI/2-(F/2)+G
510 R=2*7*SIN(F/2)
520 X=R*COS(GE)
530 Y=R*SIN(GE)
540 ENDPROC
```

Listing I

From Page 83

by drilling a hole and sticking it in with epoxy resin. Also I shaped the aluminium slightly to allow a better view of the pointer.

Remember, it is vital that the distance between the pointer and the spindle of pot B must be the same as the distance between the spindle of pot B and the spindle of pot A.

The pots must be set so that the angle they will work over is in the centre of their rotation arc. This ensures maximum linearity and minimises "end effects" on the pots.

The arm attached to pot A is made slightly longer to act as a counter balance. To reduce the length needed I melted some plumber's solder with a blowlamp into the U shaped channel of the arm. Careful study of the photograph should enable you to construct something similar.

If you are in any doubt about the construction I would try that famous firm of French consulting engineers Messieures Sucket and See.

Once the construction is complete, the preset pots need adjusting to give the maximum variation on the A/D port over the working angle. To do this, set all the preset pots at maximum and program two function keys to print the value of each analogue input channel:

***KEYO PRINT ADVAL(1)**
DIV 64 :M
***KEY9 PRINT ADVAL(2)**
DIV 64 :M

In this way you can read the input value at any time by pressing one of the keys. Move the pointer so that pot A is at one of the limits of travel, say the top right hand corner, then look at the value it gives using a function key. Then adjust preset pot PS1.

The reading should start to change as soon as you make the slightest adjustment. If not, then recheck your circuits. Carry on adjusting it until a reading just below the maximum of 1023 is achieved.

By taking the reading just below the maximum you ensure that the reading is a true measure of the pot's position. Obviously once the maximum is reached any increase in input voltage just registers as maximum. If the reading will not reach high enough then pick the other extreme of travel for pot A (that is with the pointer just to the left side of the pot).

When this has been adjusted move the pointer so that the pot is at the other extreme and adjust preset PS2

THE BEEB BODY BUILDING COURSE

until the reading reaches about 10 or so.

It is important not to take the reading right the way to zero, as then the voltage on the A/D chip would go negative. This can cause damage to the chip if it goes below –0.5 volts. When you have done this go back and check the other extreme again as the two adjustments interact.

Once this is done correctly pot B can be adjusted in a similar way, but note this time that the limits of travel will be when the pointer is just to the right of pot A and in the bottom left hand corner. With this adjustment made you can now get the maximum usable resolution out of the A/D in the computer.

Having set up the table we now need to produce the software to drive it. Listing I is a demonstration program that will enable you to use the digitiser as a sketch pad.

The first thing it does is to calibrate the table. This is necessary as the pots only produce a voltage and we need to know the relationship between this voltage and the angle of the arm joints. This relationship can be expressed as:

Angle= Voltage * Scale factor + constant

We need to find a scale factor and a translation constant for each pot. The easiest way of doing this is to place the pointer in a known position so that we can work out the size of the angle.

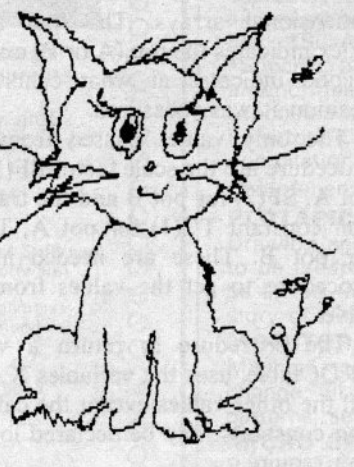
As there are two unknowns in the equation we have to do this for two positions. These two calibration points can be anywhere on the table but the farther apart they are the better. I chose to measure in inches the two corner positions of:

1) X=8 & Y=0
2) X=–6 & Y=–12

These need to be fed into the calibration program, either via the keyboard or as a program statement line. You can choose other numbers depending upon the size of the arms and whether you like to work in real inches or those funny continental milly somethings.

If these positions are not marked accurately then there will be errors in the values the table produces.

The program in Listing I has a calibration procedure PROCcal which will work out the calibration factors. Line 270 contains the calibration points that are marked on my table and the number seven in line 380 refers to the size of the arms on my table. This should be altered to suit the size of your table.



The calibration factors could be printed out and incorporated into the program PROCtable as constants, as they should not change unless the hardware is changed or the battery voltage drops.

Perhaps a better solution would be to convert these floating point values to integers and store them in eight of the integer variables A% to Z%. In this way the table would only have to be calibrated once each time the computer was switched on.

You would need two integers for each floating point number, one to hold the number and one the exponent. It makes an interesting problem converting one to the other and vice versa.

Once the table has been calibrated it is comparatively simple to extract the X,Y co-ordinate of the pointer by using the procedure PROCtable.

In line 510 the number seven again refers to the size of the arm on my table, and like the calibration routine line 380 should be changed to suit the length of arm you used when constructing your table.

The calibration and table values procedures can be incorporated into your own programs. The program in Listing I is operated as follows:

First a graphics mode is selected. This will usually be Mode 0 or 2. Secondly you will be asked to put the pointer to the first calibration position (X=8 & Y=0). When you have done this press the button (the fire button). This will be acknowledged by a short bleep. Then move it to the second position.

Finally, the screen will go blank. Pushing the button will then draw the path of the pointer on the screen. If you want to start a new line release the button, move the pointer to the new position, and then press the M key. You will now be able to draw from that point.

The two other keys used in this program are the W to wipe the screen clean and the P to call up a screen to printer dump program.

Note that this program is not included in the listing and must be loaded separately. Several have been published and the one to use depends upon the type of printer you have. A good one for the Epson is in the book "Assembly Language Programming for the BBC Computer" by Ian Birnbaum.

Note also that I have assembled the program to start at &D10 so you should alter line 210 to suit your own setup. However, you don't need a printer to use this program.

There are two techniques you can use when producing sketches. The first is to keep the button pressed as you trace round an object. This is ideal for

→

PARTS LIST

VR1 & VR2 50k linear variable resistor (wirewound if possible).
PS1 to PS4 10k skeleton preset variable resistors.
C1 and C2 1uF electrolytic capacitors.
5 pin DIN plug and socket.
Push-to-make switch.
Four 1.5 volt AA size batteries.
Battery holder to suit above.

From Page 85

free hand drawing and following complex shapes like maps.

However if the diagram consists of straight lines your hand will not be steady enough to make a perfectly straight line. In that case you can use the second method which involves moving the pointer to the point where the line is to be drawn and giving the button a short jab, then moving the pointer to the next place and repeating until the outline has been entered. This is also the best way to deal with circles – that is, to make them up as a number of straight lines rather than a freehand curve.

What to use as a master if your own art is not up to it? Well, there are many sources. However remember that the digitiser has fixed arms and you cannot use a book unless it is very thin or you bend it back to leave a page protruding.

See the accompanying illustrations for an idea of what can be achieved.

Just to tidy up the explanations of the program, the following may be of use:

Lines 120,130 convert the X and Y given by the table to values that will cover the screen.

In the calibration procedure some of the values are stored in two dimensional arrays. The first array index indicates the pot (A or B) and the second indicates at what calibration position it was measured.

The only values passed from this procedure are the scale factor SF(1) for pot A, SF(2) for pot B and the translation constant TC(1) for pot A, TC(2) for pot B. These are needed in the procedure to get the values from the table.

The procedure to return a value, PROCtable, uses the variables X & Y. All the other values except the calibration constants may be declared local if you require.

Like any program, this can be expanded to suit your own needs. For example, PROCkey can be expanded to allow you to input the colour to draw in via the GCOL statement, or to allow you to save and load the screen to and from tape or disc using a *LOAD and *SAVE.

In the program "Making the Most of Your Micro" they showed a similar digitiser being used to input pictures in different colours. Then by making one logical colour white and the rest black show only one picture. By making each logical colour white and the rest black in sequence an animation effect can be created.

You might try your hand at writing a routine that fills in a bounded area with a solid colour. If you have Operating System 1.2 then you can use the plot options 72-79 and 88-95 to help you.

The tablet is not just restricted to producing sketches. It may be used to position a pointer or cursor. It can be used to select options on a menu or coupled in some way to affect the parameters of the SOUND and ENVELOPE commands and "hear" a sketch!

You never know some day I might even get round to writing that program to produce the profiles of Pendle Hill!

If you do write a program that does something different why not submit it to the editor with a view to publication? As I said in the first of these articles, the exercises are just a starting point for you to begin exploring the limits of your imagination.

Next month's exercise: The computer hokey-cokey (you put your signals in, you put your signals out).

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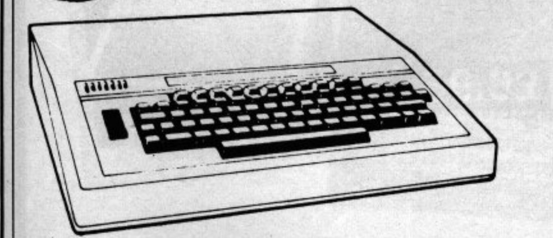

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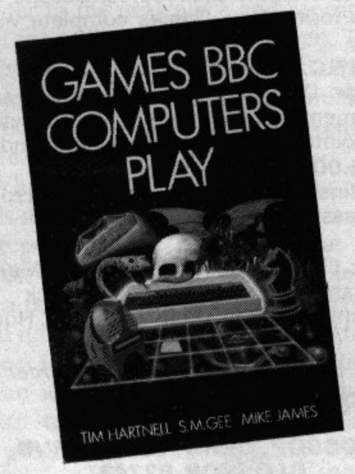
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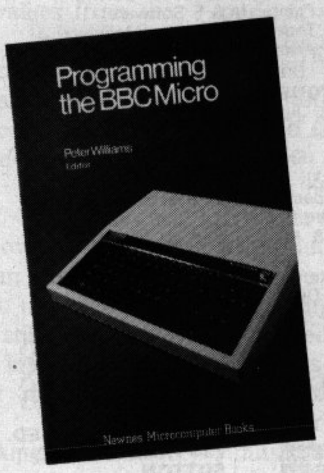
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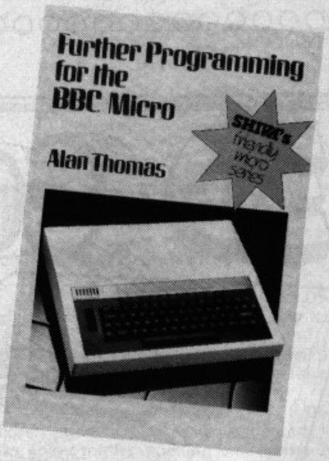
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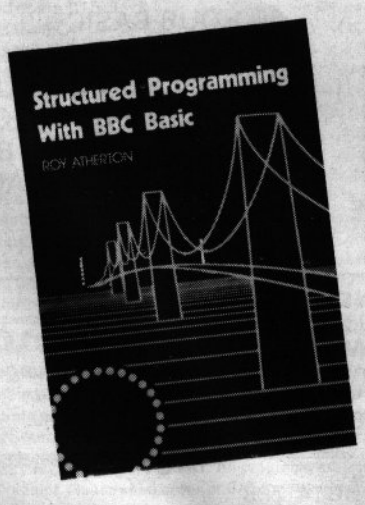
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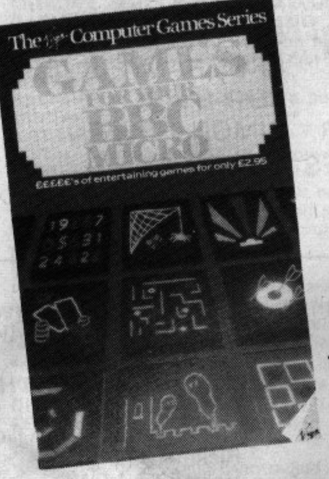
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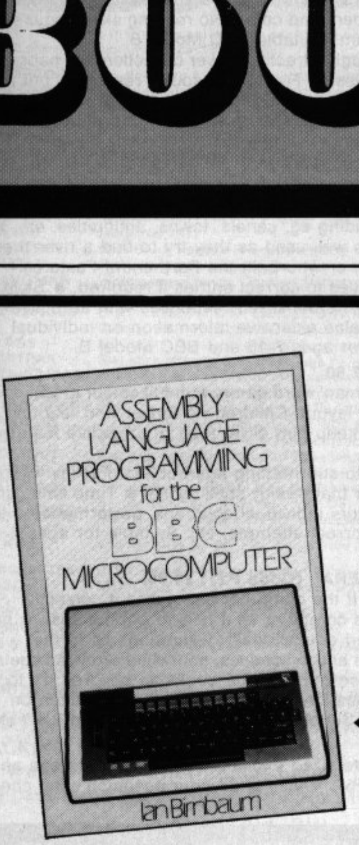
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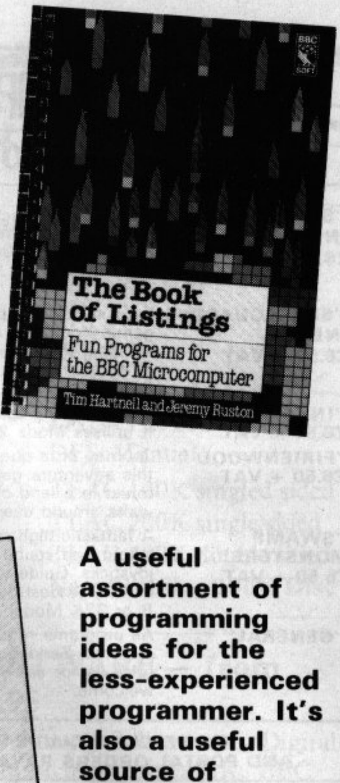
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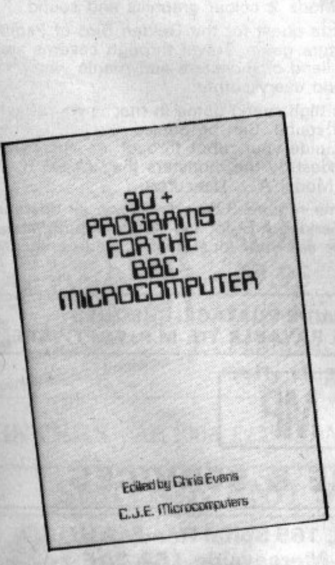
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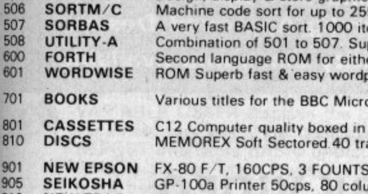

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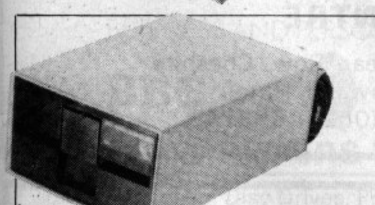

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Nomsim listing

From Page 76

```
 1010 IFpa=2pa$="poor. Much time will be
 spent on feeding and watering the cattl
e."
 1020 IFpa=3pa$="widely available. Water
 supplies should present no problems."
 1030 IFpa=4pa$="excellent. Water holes
will be full."
 1040 PRINTTAB(5,8)"PASTURE":PRINTTAB(3,
10)"AREA IS "area$
 1050 PRINT''"This rainfall means that p
asture will be"pa$
 1060 ENDPROC
 1070 DEFPROCv
 1080 VDU24,100;100;1000;300;:GCOL0,128:
CLG:VDU5
 1090 GCOL0,3:MOVE100,165:DRAW1000,165:M
OVE100,200:FORI%=1TO4:GCOL0,2:PRINTCHR$2
30;:FORK%=1TO6:PRINTCHR$X%;:NEXTK%:NEXTI
%
 1100 MOVE100,235:FORI%=1TO4:GCOL0,2:PRI
NTCHR$225;:FORK%=1TO6:GCOL0,1:PRINTCHR$3
2;:NEXTK%:NEXTI%
 1110 IFX%=228VE$="Tall grass"
 1120 IFX%=226VE$="Mixed grass"
 1130 IFX%=227VE$="Short grass"
 1140 MOVE400,275:GCOL0,3:PRINT"Acacia t
rees":MOVE400,150:PRINTVE$:VDU4:VDU26
 1150 ENDPROC
 1160 DEFPROChe
 1170 IFpa=0he=INT(he-(he/4))
 1180 IFpa=1he=INT(he-(he/6))
 1190 IFpa=2he=INT(he+(he/4))
 1200 IFpa=3he=INT(he+(he/3))
 1210 IFpa=4he=INT(he+(he/2))
 1220 IFhe<0he=0
 1230 IFpa<2a$="decreased"ELSEa$="increa
sed"
 1240 VDU19,0,15,0,0,0
 1250 COLOUR130:CLS:IFhe=0GOTO1280
 1260 COLOUR0:T%=0:REPEAT:T%=T%+1:I%=RND
(35):K%=RND(25):PRINTTAB(I%,K%)CHR$224:U
NTIL T%=he
 1270 COLOUR1:PRINTTAB(2,12)"Because the
 rainfall is ";r$:PRINT'"your herd has
";a$;" to  ";he;" cattle"
 1280 PRINTTAB(12,10)"HERD SIZE = "he
 1290 ENDPROC
 1300 DEFPROCts
 1310 COLOUR129:CLS
 1320 VDU23,231,0,0,128,192,32,16,8,4
 1330 VDU23,232,0,0,1,3,4,8,16,32
 1340 VDU23,233,7,8,16,34,34,16,8,7
 1350 VDU23,234,224,16,8,68,68,8,16,224
 1360 VDU23,235,4,24,192,192,192,192,192
,192
 1370 VDU23,236,16,12,7,3,3,3,3,3
 1380 VDU23,237,224,224,224,224,224,224,
24,7
 1390 VDU23,238,7,7,7,7,7,7,24,224
 1400 VDU23,239,16,16,16,16,16,16,16,240
 1410 VDU23,240,8,8,8,8,8,8,8,15
 1420 TS$(1)=CHR$231+CHR$232:TS$(2)=CHR$
233+CHR$234:TS$(3)=CHR$235+CHR$236:TS$(4
)=CHR$237+CHR$238:TS$(5)=CHR$239+CHR$240
 1430 COLOUR0:T%=0:REPEAT:T%=T%+1:I%=RND
(35):K%=RND(25):FORJ%=1TO5:PRINTTAB(I%,K
%)TS$(J%):K%=K%+1:NEXTJ%:UNTIL T%=(pa+1)
*10
 1440 COLOUR2:PRINTTAB(12,10)"TSETSE NEW
S!"
 1450 IFino=1PROCnots
 1460 IFino=1ENDPROC
 1470 PRINT'"Area is "area$
 1480 IFar$="FL"PROCfl2
 1490 IFar$="FO"PROCfo2
 1500 IFar$="PL"PROCpl2
 1510 PRINT'"The rainfall this year is "
r$:PRINT'"So you will lose "f$" of your
herd.":PRINT'"You now have ";he" cattle"
 1520 ENDPROC
 1530 DEFPROCfl2
 1540 IFr=0PROCTS2
 1550 IFr>0ANDr<3PROCTS3
 1560 IFr>2PROCTS4
 1570 ENDPROC
 1580 DEFPROCfo2
 1590 IFr=0PROCTS1
 1600 IFr>0ANDr<3PROCTS2
 1610 IFr>2ANDr<5PROCTS3
 1620 IFr=5PROCTS4
 1630 ENDPROC
 1640 DEFPROCpl2
 1650 IFr<2PROCTS1
 1660 IFr>1PROCTS2
 1670 ENDPROC
 1680 DEFPROCTS1
 1690 f$="none":PRINT"The rainfall is ve
ry low this year so   you will not be af
fected by Tsetse fly"
 1700 ENDPROC
 1710 DEFPROCTS2
 1720 he=he-INT(he/8):f$="1/8"
 1730 ENDPROC
 1740 DEFPROCTS3
 1750 he=he-INT(he/5):f$="1/5"
 1760 ENDPROC
 1770 DEFPROCTS4
 1780 he=he-INT(he/3):f$="1/3"
 1790 IFhe<0he=0
 1800 ENDPROC
 1810 DEFPROCc
 1820 c=RND(6)
 1830 IFc=2ANDino=1THEN1820
 1840 IFc=0PROCdi
 1850 IFc=1PROCraid
 1860 IFc=2PROCtsinoc
 1870 IFc=3ANDpe<3GOTO1820
 1880 IFc=3ANDpe>2PROCson
 1890 IFc=4ANDpe<3GOTO1820
 1900 IFc=4ANDpe>2PROCb
 1910 IFc=5ANDar$="FL"PROCfloods
 1915 IFc=5ANDar$<>"FL"GOTO1820
 1920 IFc=6PROCrelax
 1930 ENDPROC
 1940 DEFPROCdi
 1950 PRINTTAB(5,10)"DISEASE STRIKES!!":
PRINT'"You lose half your cattle":he=INT
(he/2):PRINT'"You now have ";he" cattle"
 1960 IFhe<0he=0
 1970 ENDPROC
 1980 DEFPROCraid
 1990 PRINTTAB(5,10)"RAIDERS STRIKE!!":P
RINT'"One quarter of your herd is taken
by    raiders from across the border":he
=he-INT(he/4):IFhe<0he=0
 2000 PRINT'"You now have ";he;" cattle
left"
 2010 ENDPROC
 2020 DEFPROCtsinoc
 2030 PRINTTAB(5,10)"TSETSE INNOCULATION
 SCHEME":PRINT'"Your cattle are innocula
ted by men from the government vetinary
service.From nowon you need not worry ab
out the tsetse  problem"
 2035 ino=1
 2040 ENDPROC
 2050 DEFPROCson
 2060 PRINTTAB(5,10)"YOUR SON COMES OF A
GE":PRINT'"You must give your son 10 cat
tle to     start him off":he=he-10:IFhe<
0he=0
 2070 PRINT'"You now have ";he" cattle b
ut you have one less mouth to feed":pe=p
e-1
 2080 ENDPROC
 2090 DEFPROCb
 2100 PRINTTAB(5,10)"A BIRTH IN YOUR FAM
ILY":PRINT'"A baby is born this year whi
ch increasesthe size of your family"
 2110 PRINT'"You now have ";he" cattle b
ut you have one more mouth to feed":pe=p
e+1
 2120 ENDPROC
 2130 DEFPROCfloods
 2140 PRINTTAB(5,10)"FLOODS ON FLOODPLAI
N":PRINT'"Pastures are flooded.":PRINT'"
There is not enough grazing.":PRINT'"You
 lose 1/4 of your cattle."
 2150 he=he-INT(he/4):IFhe<0he=0
 2160 PRINT'"You have ";he" cattle"
 2180 ENDPROC
 2190 DEFPROCrelax
```

→

Nomsim listing

From Page 94

```
 2200 PRINTTAB(5,10)"RELAX!!":PRINT'"No
problems this year."
 2210 ENDPROC
 2220 DEFPROCnots
 2230 PRINTTAB(5,10)"CATTLE HAVE BEEN IN
NOCULATED":PRINT''"No need to worry abou
t this problem."
 2240 ENDPROC
 2250 DEFPROCmk
 2260 COLOUR131:CLS
 2270 COLOUR1:PRINTTAB(12,5)"MARKET"
 2280 PRINT''"Your cattle do not provide
 you with     everything you need.":PRIN
T'"You must sell some cattle to pay taxe
s  buy corn and other things for your
   family."
 2290 IFr<2se=pe*4:he=he-se:IFhe<0he=0
 2300 IFr<2PRINT'"Because the rainfall w
as low you have to sell 4 cattle for eac
h member of the    family i.e. ";se;" ca
ttle"
 2310 IFr>1se=pe:he=he-se:IFhe<0he=0
 2320 IFr>1PRINT'"Because the rainfall w
as high you only  have to sell 1 animal
for each member ofthe family i.e. ";se;"
 cattle"
 2330 PRINT'"You now have ";he;" cattle
left"
 2340 ENDPROC
 2350 DEFPROCsum
 2360 VDU19,0,4,0,0,0:COLOUR128:CLS
 2370 COLOUR3:PRINTTAB(6,1)"SUMMARY SHOW
ING HERD SIZES"
 2380 MOVE200,950:DRAW1010,950
 2390 MOVE200,150:DRAW1100,150:MOVE200,1
50:DRAW200,900
 2400 PRINTTAB(1,28)"YEAR"
 2410 VDU5:no=0:GCOL0,2:FORK%=160TO935ST
EP75:MOVE100,K%:no$=STR$(no):PRINTno$:no
=no+20:NEXT
 2420 FORI%=235TO945STEP75:MOVE170,I%:PR
INT"-":NEXT
 2430 MOVE185,150:FORI%=185TO1140STEP100
:MOVEI%,150:PRINT"|":NEXT
 2440 yr=1:MOVE185,100:FORI%=185TO1140ST
EP100:MOVEI%,100:yr$=STR$(yr):PRINTyr$:y
r=yr+1:NEXT
 2450 Z%(Y%)=Z
 2460 Z=Z+100
 2470 FORI%=1TOY%
 2480 MOVEZ%(I%),160+(H%(I%)*3.75):GCOL0
,1:PRINT"*"
 2490 NEXT
 2500 VDU4:ENDPROC
 2510 DEFPROCend
 2520 CLS:PRINTTAB(2,3)"A SERIOUS SITUAT
ION HAS DEVELOPED!"
 2530 PRINTTAB(3,12)"Your herd has falle
n below 10 for    each person so you can
 no longer supportyour family"
 2540 PRINT"You must find employment as
a herdsmen  for somebody else and start
again when  you have built up your cattl
e numbers"
 2550 PRINT'"Your family has "pe" person
s":PRINT'"Your herd is only "he" cattle"
 2560 Y%=10
 2570 ENDPROC
 2580 DEFPROCsp
 2590 PRINTTAB(1,30)"PRESS SPACE BAR TO
CONTINUE"
 2600 Z$=GET$:IFZ$<>" "THEN2600
 2610 ENDPROC
```

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Space Pilot listing

From Page 60

```
380 MOVE 1000,0
    :GCOL 0,1
    :DRAW 1000,64
    :PLOT 85,1064,0
    :PLOT 85,1064,64
    :VDU 5
    :GCOL 0,3
    :MOVE 1016,40
    :PRINT ;INT (BA%/10)
    :GCOL 0,0
    :FOR N%=0TO 64STEP 4
    :MOVE 0,N%
    :DRAW 964,N%
    :NEXT
    :ENDPROC
390 DEF PROCA
    :GCOL 4,0
    :FOR N%=1TO 3
    :MOVE X%+SC%,Y%
    :DRAW 640,520
    :SOUND 1,-15,200,1
    :FOR M%=1TO 500
    :NEXT
    :DRAW X%+SC%,Y%
    :NEXT
400 IF RND (5)<3ENDPROC
410 M%=1
420 VDU 19,3,0,0,0,0,19,0,3,0,0,0,4
    :*FX15,1
430 SOUND 0,1,4,10
    :FOR N=1TO 50
    :FOR M=1TO 2
    :VDU 23,0,13,M;0;0;0;
    :NEXT
    :NEXT
    :VDU 19,0,0,0,0,0,19,3,7,0,0,0,23
    ,0,13,0;0;0;0;
    :TIME =0
440 PRINT TAB(22,23);
    :IF M%=1PRINT "We've been hit"
    ELSE IF M%=2PRINT "CRASH LANDING"
    ELSE IF M%=3PRINT "* COLLISION
     *"
450 PRINT TAB(12,27);DA%+1
460 REPEAT UNTIL TIME >40
    :TIME =0
    :DA%=DA%+1
    :IF DA%>4GOTO 470
    ELSE ENDPROC
470 TIME =0
    :VDU 26
    :REPEAT UNTIL TIME >50
    :SOUND 0,1,5,30
    :FOR N%=3TO 0STEP -1
    :VDU 19,0,N%,0,0,0
    :FOR M%=1TO 20
    :MOVE 640,512
    :GCOL 0,RND (3)
    :DRAW RND (1280),RND (1024)
    :NEXT
    :NEXT
480 PRINT TAB(15,10);"GAME  OVER"
    :TIME =0
    :REPEAT UNTIL TIME >200
490 ENDPROC
500 DEF PROCQ
    :W%=1
    :V%=RND (3)
    :IF V%<2GOTO 510
    ELSE IF V%=3V%=RND (3)
    :IF V%=1W%=10
    :PROCDOCK
    :V%=RND (2)
    :W%=1
    ELSE IF V%=2GOTO 510
    ELSE PROCLAND
    :V%=RND (2)
    :W%=1
510 FR%=20*V%
    :X%=400+RND (400)
    :X1%=X%
    :Y%=1000-RND (400)
    :Y1%=Y%
    :MOVE X%,Y%
    :SC%=BSC%
    :OS%=SC%
    :GCOL 4,0
    :PROCRUB(SC%)
    :VDU 4
    :PRINT TAB(1,23);"S/Ship approach
    ing"
    :ENDPROC
520 DEF PROCAL
    :IF SC%<100SC%=SC%+RND (2)-1
530 X%=X%+XM%
    :Y%=Y%+RND (31)-15
540 GCOL 4,0
    :IF X%>900OR X%<400PROCXCOR
550 IF Y%<500OR Y%>1000PROCYCOR
560 IF RND (FR%)=1AND SC%>30PROCA
570 MOVE X1%,Y1%
    :PROCRUB(OS%)
    :PROCM(-1)
    :Y1%=Y%
    :X1%=X%
    :MOVE X%,Y%
    :OS%=SC%
    :PROCRUB(OS%)
    :ENDPROC
580 DEF PROCXCOR
    :IF X%<400XM%=10
    ELSE XM%=-10
590 ENDPROC
600 DEF PROCYCOR
    :IF Y%<500Y%=Y%+30
    ELSE Y%=Y%-30
610 ENDPROC
620 ENDPROC
630 DEF PROCRUB(Q%)
    :Q%=Q%+20
    :ON V%GOTO 640 ,650
640 PLOT 1,Q%,Q%
    :PLOT 1,Q%,-Q%
    :PLOT 1,-Q%,-Q%
    :PLOT 1,-Q%,Q%
    :ENDPROC
650 DQ%=Q%/4
    :PLOT 1,DQ%,DQ%
    :PLOT 1,Q%,0
    :PLOT 1,DQ%,-DQ%
    :PLOT 1,-DQ%,-DQ%
    :PLOT 1,-Q%,0
    :PLOT 1,-DQ%,DQ%
    :ENDPROC
660 DEF PROCCRO
    :MOVE 480,768
    :DRAW 608,768
    :MOVE 672,768
    :DRAW 800,768
    :MOVE 640,896
    :DRAW 640,800
    :MOVE 640,736
    :DRAW 640,640
    :ENDPROC
670 DEF PROCDOCK
    :CLG
    :GCOL 0,2
    :VDU 19,2,5,0,0,0
    :FOR N%=500TO 700STEP 4
    :MOVE 320,N%
    :DRAW 964,N%
    :NEXT
    :TIME =200
    :PROCRO
680 MOVE 608,700
    :VDU 5
    :GCOL 0,0
    :VDU 255,255
    :MOVE 608,668
    :VDU 5
    :VDU 255,255
```

→

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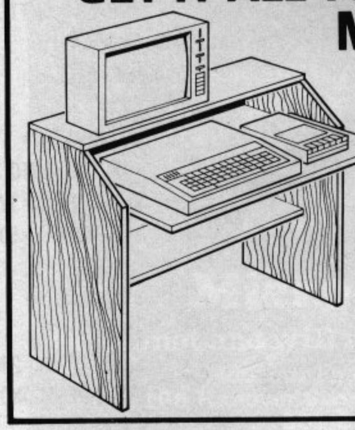

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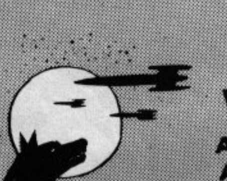

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Space Pilot listing

From Page 97

```
690 X%=270
    :Y%=RND (100)+800
    :OX%=X%
    :OY%=Y%
    :GCOL 4,0
700 PROCM(1)
    :X%=X%+RND (6)
    :Y%=Y%+RND (11)-6
    :MOVE OX%,OY%
    :VDU 224
    :MOVE X%,Y%
    :VDU 224
    :OX%=X%
    :OY%=Y%
710 PROCFO
    :GCOL 4,0
720 IF F<8ENDPROC
730 IF NOT (X%>1000OR Y%<732)
    GOTO 700
    ELSE IF Y%<732GOTO 750
740 GCOL 0,3
    :PRINT TAB(11,29);S%
    :CLG
    :PROCCRO
    :VDU 19,2,7,0,0,0
    :ENDPROC
750 IF X%>608AND X%<640GOTO 780
760 M%=3
    :PROCLL
    :IF DA%<5GOTO 740
    ELSE ENDPROC
770 DEF PROCLL
    :VDU 4
    :GOTO 420
780 IF Y%>690GOTO 700
790 FOR N%=1TO 5
    :SOUND 1,-15,200,1
    :SOUND 2,-15,220,1
    :TIME =0
    :REPEAT UNTIL TIME =10
    :S%=S%+400
    :NEXT
800 GCOL 4,0
    :MOVE 400,800
    :PRINT "DOCKING COMPLETE"
810 PROCFU(150,50)
820 VDU 4
    :PRINT TAB(1,22);SPC (27)
    :GOTO 740
830 DEF PROCLAND
    :CLG
    :N%=300
    :REPEAT
    :MOVE N%,500
    :N%=N%+25+RND (25)
    :DRAW N%,RND (200)+500
    :N%=N%+25+RND (25)
    :PLOT 85,N%,500
    :N%=N%-RND (20)+10
    :UNTIL N%>950
840 FOR N%=500TO 650STEP 4
    :MOVE 620,N%
    :DRAW 680,N%
    :NEXT
    :GCOL 0,1
    :FOR N%=650TO 700STEP 4
    :IF N%>670GCOL 0,0
850 MOVE 620,N%
    :DRAW 680,N%
    :NEXT
    :TIME =200
    :PROCRO
860 X%=RND (300)+450
    :Y%=950
    :VDU 5
    :GCOL 4,0
    :DR1%=1
    :DR%=-1
870 MOVE X%,Y%
    :VDU 225
880 X1%=X%
    :Y1%=Y%
    :Y%=Y%+DR1%/20
    :X%=X%+DR%/10
890 IF INKEY (-122)DR%=DR%+2
    ELSE IF INKEY (-26)DR%=DR%-2
900 IF INKEY (-99)DR1%=DR1%+2
    :MOVE X%,Y%
    :VDU 226
    :PROCFO
    :GCOL 4,0
    :SOUND 0,-5,4,1
    :MOVE X%,Y%
    :VDU 226
    :IF F<8ENDPROC
910 DR1%=DR1%-1
    :MOVE X1%,Y1%
    :VDU 225
920 P1%=POINT(X%,Y%-32)
    :P2%=POINT(X%+32,Y%-32)
    :IF P1%<>0OR P2%<>0GOTO 930
    ELSE GOTO 870
930 IF P1%<>1OR P2%<>1GOTO 960
940 IF DR1%<-20GOTO 960
    ELSE PROCFU(200,200)
    :DA%=DA%-2
    :IF DA%<0DA%=0
950 VDU 4
    :PRINT TAB(12,27);DA%
    :PRINT TAB(11,10);"Landing Bonus
     ";100*(40+DR1%)
    :S%=S%+100*(40+DR1%)
    :PRINT TAB(11,29);S%
    :PRINT TAB(1,22);SPC (27)
    :TIME =0
    :REPEAT UNTIL TIME >100
    :GOTO 970
960 M%=2
    :DA%=DA%+1
    :PROCLL
    :IF DA%>4ENDPROC
970 CLG
    :GCOL 0,3
    :PROCCRO
    :ENDPROC
990 DEF PROCG
    :IF L%<=4ENDPROC
    ELSE GCOL 4,0
    :FOR N%=1TO 3
    :SOUND 1,-15,200,1
    :FOR M%=1TO 2
    :MOVE 880,530
    :DRAW 640,758
    :MOVE 402,530
    :DRAW 640,758
    :NEXT
    :NEXT
    :L%=L%-8
1000 PROCHIT
    :VDU 26
    :MOVE 148,L%+512
    :GCOL 0,0
    :DRAW 178,L%+512
    :MOVE 148,L%+516
    :DRAW 178,L%+516
    :GCOL 0,3
    :F=F-0.1
    :PROCFO
    :GOTO 1280
1010 DEF PROCHIT
    :IF X%+SC%>608AND X%+SC%<672
    AND Y%<800AND Y%>732PROCY
    ELSE COLOUR 3
    :VDU 4
    :PRINT TAB(31,22);"Miss"
    :TIME =0
1020 ENDPROC
1030 DEF PROCT
    :VDU 4,26
    :IF INT (F)=75PRINT TAB(1,22)
    "Fuel low"
1040 IF L%<75AND L%>60PRINT TAB(12,22)
    "Laser energy low"
```

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Space Pilot listing

From Page 99

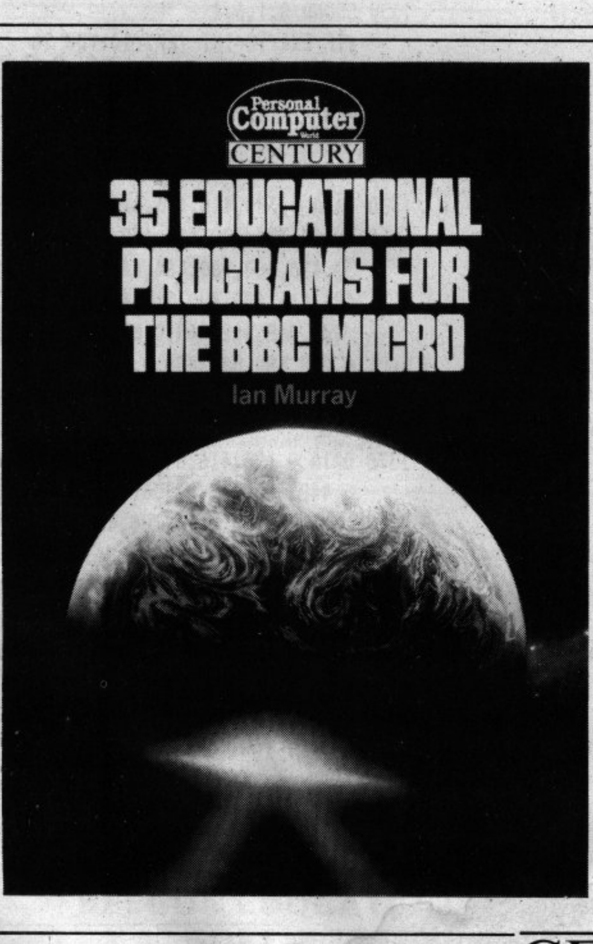
```
1050 IF TIME >100AND TIME <300
     VDU 4
     :PRINT TAB(31,22);"    ";
     TAB(22,23);SPC (14)
1060 PROCFO
1070 ENDPROC
1080 DEF PROCRO
     :IF TIME >100AND TIME <300
     VDU 4
     :PRINT TAB(31,22);"    ";
     TAB(22,23);SPC (14)
1090 ENDPROC
1100 DEF PROCFO
     :VDU 26
     :F=F-0.5
     :MOVE 1108,F+512
     :GCOL 0,0
     :DRAW 1138,F+512
     :GCOL 0,3
     :GOTO 1280
1110 DEF PROCH(A$,A,B)
     :FOR N%=1+B TO LEN A$+B
     :PRINT TAB(A,N%);MID$(A$,N%-B,1)
     :NEXT
     :ENDPROC
1120 DEF PROCFU(W,W1)
     :F1=F
     :F=F+W
     :IF F>504F=504
1130 GCOL 0,1
     :VDU 26
     :FOR N%=INT F1 TO F-4 STEP 4
     :MOVE 1108,N%+512
     :DRAW 1138,N%+512
     :NEXT
     :L1=L%
     :L%=L%+W1
     :IF L%>504L%=504
1140 VDU 26
     :FOR N%=L1 TO L%-4STEP 4
     :MOVE 148,N%+512
     :GCOL 0,1
     :DRAW 178,N%+512
     :NEXT
     :GOTO 1280
1150 DEF PROCI
1160 F=508
     :L%=504
     :V%=0
     :DA%=0
     :S%=0
     :SC%=10
     :OS%=10
     :XM%=10
     :FR%=20
     :EK%=0
     :SH%=30
     :BSC%=10
     :HE%=1
     :ENDPROC
1170 DEF PROCS
1180 PROCSPI
     :PROCCRO
1190 MOVE 316,508
     :DRAW 316,1023
     :DRAW 964,1023
     :DRAW 964,508
     :DRAW 316,508
1200 MOVE 144,512
     :DRAW 182,512
     :DRAW 182,1023
     :DRAW 144,1023
     :DRAW 144,512
     :GCOL 0,1
     :FOR N%=148TO 178STEP 4
     :MOVE N%,516
     :DRAW N%,1019
     :NEXT
1210 PROCH("Laser energy",2,1)
1220 GCOL 0,3
     :MOVE 1104,512
     :DRAW 1142,512
     :DRAW 1142,1023
     :DRAW 1104,1023
     :DRAW 1104,512
     :GCOL 0,1
     :FOR N%=1108TO 1138STEP 4
     :MOVE N%,516
     :DRAW N%,1019
     :NEXT
1230 PROCH("Fuel",37,4)
1240 PRINT TAB(5,20)"Scanners:"
1250 GCOL 0,3
     :MOVE 0,322
     :DRAW 1279,322
     :DRAW 1279,250
     :DRAW 0,250
     :DRAW 0,322
1260 PRINT TAB(5,27);"Damage:0";
     TAB(5,29);"Score:0"
1270 VDU 19,2,0,0,0,0
1280 VDU 24,320;512;960;1019;
1290 ENDPROC
1300 DEF PROCSPI
     :RESTORE 1360
     :GCOL 0,3
     :VDU 26
     :REPEAT
     :READ A,B
     :IF A=0READ C
     :MOVE B,C
     ELSE DRAW A,B
1310 UNTIL A=880
     :ENDPROC
1320 DEF PROCY
     :VDU 5,19,0,7,0,0,0,3,0,0,0,0
     :MOVE X%,Y%
     :GCOL 4,0
     :PROCRUB(OS%)
     :EK%=EK%+1
     :BSC%=BSC%+RND (2)-1
     :VDU 4
     :PRINT TAB(1,23);SPC (18)
     :PRINT TAB(31,22);"Hit "
     :X%=0
     :Y%=0
     :S%=S%+110-SC%+BSC%
     :SC%=10
     :OS%=10
     :VDU 20
     :TIME =0
     :V%=0
     :PRINT TAB(11,29);S%
1330 SOUND 0,1,6,1
     :IF EK%/10=INT (EK%/10)VDU 26
     :PROCBADGE(EK%/10)
     :GOTO 1280
1340 IF BSC%>50+10*HE%PROCNEWS
1350 ENDPROC
1360 DATA 0,384,416,416,416,416,448,38
     4,448,384,480,416,480,0,432,416,4
     32,480,464,480,464,448,432,448,0,
     480,416,480,480,512,480,512,416,0
     ,480,448,512,448,0,560,416,528,41
     6,528,480,560,480,0,608,480,576,4
     80,576,416,608,416,0,608,448,576,
     448
1370 DATA 0,688,416,688,480,720,480,72
     0,448,688,448,0,736,416,736,480,0
     ,752,480,752,416,784,416,0,800,41
     6,800,480,832,480,832,416,800,416
     ,0,864,416,864,480,848,480,880,480
1380 DATA 66,121,32,74,46,77,99,70,97,
     114,108,97,110,101,32,49,57,56,51
1390 DEF PROCINST
     :FOR N=1TO 2
     :PRINT TAB(10);
     :VDU 141,129,157,135
     :PRINT "Space Pilot  ";CHR$ 156
     :NEXT
1400 PRINT '" There are three differen
```

→

Space Pilot listing

From Page 101

```
     t stages to thegame.Firstly,direc
     t combat."
1410 PRINT " Aliens approach firing
      at you,and you  must manoeuvre
      yourself so that they arein
      your sights and fire.Aim near
      the    centre of the attacker
      to ensure its    destruction."
1420 PROCKD
1430 PROCFKY
1440 PRINT " Secondly,docking a supply
      satellite    with your ship."'
     " Your ship is shown on the botto
     m of thescreen,and the satellite
      approaches fromthe left.You
      must guide it into the     squar
     e hatch in your ship,being carefu
     l"
1450 PRINT "not to collide.You get
      2000 points and  more fuel and
      laser energy if you dock  succes
     sfully."
1460 PRINT " Keys:"
1470 PRINT
     :PROCKD
1480 PRINT
     :PROCFKY
1490 PRINT " Lastly,landing a ship
      on a planet.The  planet is drawn
      beneath your lander,and there
      is a red landing patch in the
         centre of the screen which
     you must aim for.You must not
      collide with the"
1500 PRINT "mountains or go off the
      screen.Your     speed at touchdo
     wn must be very low.You get 2000-
     4000 points,extra fuel and
        laser energy,and damage repair
     ed for a  good landing."
1510 PRINT " Keys:       SPACE - THRUS
     T(UP)"'
     :PRINT TAB(11);"LEFT ["TAB(22);
     "] RIGHT"
1520 PRINT
     :PROCFKY
1530 PRINT " If your damage exceeds
      four or you run out of fuel,the
      game ends."
1540 PRINT " Press any key to start."
1550 GOTO 1570
1560 DEF PROCFKY
     :PRINT "Press any key......";
     :*FX15,1
1570 A$=GET$
     :CLS
     :ENDPROC
1580 DEF PROCKD
     :PRINT TAB(19);"UP"''TAB(19);
     "A"''TAB(11);"LEFT ["TAB(22);
     "] RIGHT"''TAB(19);"Z"''TAB(18);
     "DOWN"
     :ENDPROC
```



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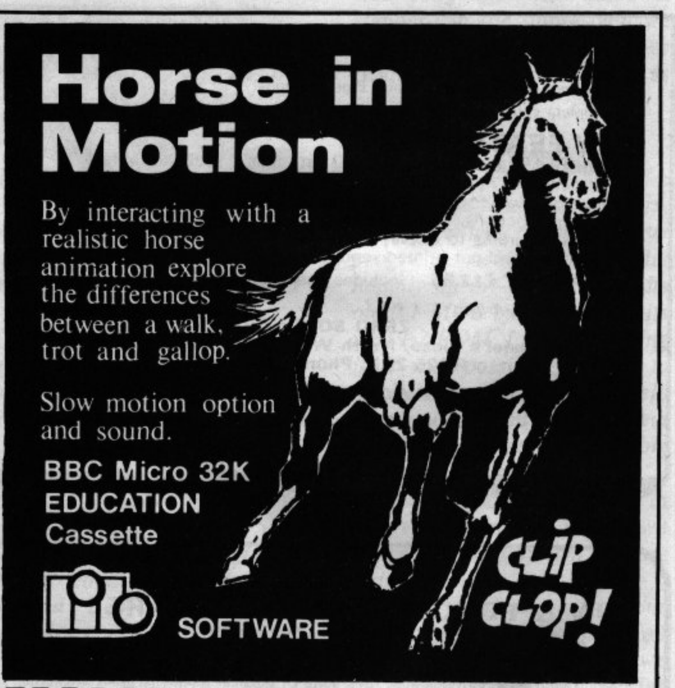

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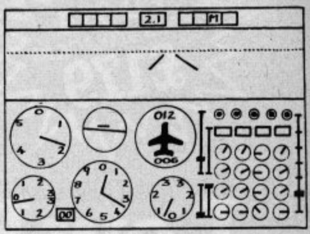

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MICROMAIL

How to get new OS fitted free of charge

I HAVE recently received a free 1.2 OS ROM from Acorn. Further, I found an Acorn dealer to fit it (just in case) without charge!

It should not be necessary for anyone who has purchased a BBC computer fitted with a 0.1 OS to pay for the supply and installation of a series 1.2 OS in order to bring the machine up to specification.

It is only necessary to point out to the vendors that the computer does not meet the implied specification in one important respect – that the computer will not support paged ROMs, for example a word processor such as Wordwise (see page 4 BBC Information Sheet G2, December 1981).

As I see it (and so, incidentally, does the local Trading Standards Office) anyone owning a BBC Micro fitted with a series 0.1 OS is entitled to have a 1.2 OS fitted free of charge!

It may be worthwhile sending the bill for the supply and fitting of the 1.2 OS to the vendor from whom the machine was originally purchased.

Please note that the fact that the computer's performance may exceed the original specification when fitted with the 1.2 OS is, as we say, "neither here nor there" – **W.M. Dunning, Potters Bar.**

● Thank you for your letter, I've not heard of any other individual getting the new OS without charge, though apparently one education authority not too far from the centre of Manchester has managed to get its upgrades free.

Avoid the void

MESSRS. Poeth and MacRab deserve commendation for their article on the Splurge language in your May issue.

I presume that lack of space prevented them from mentioning the Reverse Indirection Operator Supmost (Step Until Paged MOS True).

Although very user friendly, it is worth pointing out that incautious use of this operator can produce the effect of a black hole in the centre of the VDU, through which all subsequent programs disappear rather faster than the speed of light. – **W.P. Wishlade, Knaresborough.**

Splurge revisited

RECENTLY a press release has come to us entitled "Splurge revisited". This product, version 3.9 is now available on ROM and almost reaches the original published specification.

A usually reliable source from the sixth generation project in Cambridge informs us that this language has been selected as the latest mouse-machine interface, a dedicated Splurge machine having reached final test status.

This machine runs U code as its native language and achieves speeds very nearly approaching that of the interpreted version.

A very exciting feature is the provision of cross decompiles. These accept either machine code or E code as source and decompile through E,R,U and L code to P code.

Furthermore each stage of this full feature decompiler is speed optimised, producing extremely fast if large code. It is hoped that future machines will have space to store the resulting programs.

A special CAD package has been produced which when involved with SCREATE produces plans for a computer to run the code produced by the stockastic decompile command.

This can be linked to its internal modem as a marketing aid, informing all customers that delivery will be 10-15 days.

Other worthwile extensions to the language include ability to use long or short variables. The function LONG assigns strings to produce long variables while the stochastic SLONG assigns differing strings on each occurence of the variable. SHORT provide the reverse facility.

Other design innovations include single key command entry through use of a conventional Ascii keyboard combined with function, shift, control and Splurge keys.

So efficiently is this designed that some commands actually require fewer depressions than typing normally.

Finally this product, although oversubscribed, will be available on a preferential mail order basis to those having purchased Splurge I in Eprom – delivery will be 10-15 days! – **B. Mused, Ham, Surrey.**

Unhappen you're right

YOUR readers may be interested in the thinking behind the IF/THEN/DONT construct of Splurge (Poeth, Macrab, BBC Micro User 3).

This was proposed by members of the SCB Schools Committee who had observed users writing code and jumping round it with a GOTO statement.

The IF/THEN/DONT is a safer and more natural construct, which achieves the same effect.

I can also reveal two further inclusions in the 1983 specification of Splurge. The first became necessary when it was realised that the use of COME FROM could contradict the Second Law of Thermodynamics.

This was confirmed (Macfargle, Zlopjstra, 1981) when a small rise in temperature was detected as a result of 16,384 iterations involving the use of COME FROM.

The problem was caused by code lying between the COME FROM statement and its target.

The solution to this was Ynot Eraoh's brilliant UNHAPPEN command, which negates the effect of code already executed.

Your junior school readers will appreciate the problems this caused in software, particularly with recursive descent compilers, but these have been solved.

Unfortunately the UNHAPPEN construct caused further difficulties in stochastic models, and could not properly be applied to code which was only randomly executed.

The UNPERHAPS statement solves this problem. – **Roy Atherton, Reading.**

● Splurge has been causing a great deal of excitement. Has any of our readers attempted to write a Basic interpreter for it? We'd certainly publish one. The advanced structures available in this language will make it standard in the future, and we would like to acquaint our readers with it as soon as possible.

ROM crash

HAVING spent many hours, mostly fruitless, trying to rescue programs which ran quite happily on my Beeb B with its old 0.1 MOS but crash with its new 1.2 ROM, I was wondering if it was possible for you to publish an article to help newcomers like myself to amend programs to suit the operating system.

Please could you state in future listings of your own which operating system they are written for.

● We try to ensure that our programs work fully under all operating systems. Certainly we haven't published any so far that are machine specific.

The main problem comes in trying to use OS 0.1 programs which "break the rules" on OS 1.2 machines. Often these directly access machine code routines in the OS whose

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MICROMAIL-

From Page 105

addresses have changed in the new versions.

The problem that affects most "home-grown" Basic programs, however, comes when the graphics and text cursors are joined with VDU 4. Although the User Guide prohibits it, many programmers found that TAB( ) still worked under these conditions – so they used it. However, as Acorn warned, the new versions do not support this, and the programs crash.

Joystick conversion

DEATHWATCH was very good but could you let me know how to convert to Joystick as I am a novice and think it should be in assembly language.

I would also like to take this opportunity to congratulate you on a necessary supplement to the 'B' as I have dabbled in all other publications and have found these puny in comparison to yours. – **H. Morgan, Crossgar, Co. Down.**

● Has anyone out there adapted Deathwatch for joysticks? If so, please let us know – we've had lots of similar letters!

Order in court

IT'S sad to see a good man fall prey to disillusion, and I soaked several hankies while reading Paul Beverley's tentative approval of the use of indirection operators in BBC Micro User volume 1, No. 2.

Let me explain. In the May 1982 edition of Personal Computer World (hats off, please), a letter appeared from a Mr Paul Beverley, of which I quote the final paragraph:

> "Listen, all you 'advanced programmers'! Don't waste your time POKEing around. The BBC machine has so many facilities within its operating system that it will take you all your time to sort those out and write articles explaining them to others. Then by the time you've sorted all that lot out you'll find yourself wanting to use a second processor, and the good habit you've developed of using calls instead of POKEs, will mean that ALL your programs will run on the second processor and you will have proved who really is an 'advanced programmer'!"

Strong stuff, what? But then, in spring '82 golden light shone strong from a sapphire sky over emerald lawns in Chipland.

We were promised a bugless, final MOS, second processors galore, add-ons, hang-ons, clip-ons, stick-ons and a stable Basic for the economy.

Our ZX colleagues hummed a catchy tune, "Coming soon – The Microdrive", which seemed to sum up our boundless hope and optimism as the sun passed through the RAM and we advanced, parasang upon parasang into the brave new world.

Today we are sadder and wiser. We sing "She'll be coming round the mountain when she comes" at each new announcement of a phantom pregnancy from Cambridge.

Eagerly awaited developments do not materialise, while a change we do not want, and Acorn deny they are making, a new Basic, leaks into the market and turns the software writers into whirling dervishes.

Dealers skulk around in dark glasses, their hats pulled down over their faces, to avoid innocent but embarrassing questions. Acorn's promises are sound. And fury. Signifying nothing.

You may care to ponder how much time is being spent at Acorn on the second processors.

The Electron is currently flavour of the month, and when they've got that out of their hair, the Business Machine will absorb all the attention.

Yes, I know the Electron is only a simple strip-down of the BBC, but can you imagine the engineers leaving it at that? Neither can I. If that's all it is, it would have been on the market months ago.

And the Business Machine is a big project for a small company. So what time is available for old-hat BBCs? The tea break, probably. In Chipland, all your important products are in the future, not in the past.

Gentlemen of the jury, Kid Curry and Hannibal Hauser have broken the terms of the amnesty extended to them during the long delivery delays of last year.

May I suggest that the engineers among you form a posse, gallop madly over to Cambridge and give them the assistance they so obviously need?

Otherwise it may be necessary to heave the poor little owl overboard and replace him with a butterfly.

M'lud, my case rests.

(Sits down amid a cloud of legal wigdruff, knocks ciggy ash into coffee, curses, and resumes work on new Wonderworld Fantamaze Adventure "Castle of Wiggles".) – **Roger Bagnall, Maidenhead.**

Elusive recorder

CONGRATULATIONS to all concerned on an excellent magazine. I am the proud owner of a BBC Micro B but a not so proud owner of a cassette recorder.

Could you please help? I have been trying to obtain the elusive cassette recorder for the BBC Micro for over eight weeks now. I decided not to order one because at first I thought that a cassette recorder would be the least of my worries. But it's not just the problem of actually obtaining a recorder, but also finding a compatible one.

Am I the only person faced with this dilemma? I would be pleased (an understatement) if you could recommend a suitable recorder and a reputable dealer who has them in stock ready to be bought and not just ordered. – **Steven Solsby, Walney Island.**

● I've talked to several firms who market cassettes for the BBC Micro and the story is always the same. Apparently you can import one set of recorders that work perfectly with the BBC Micro (or can be adapted to do so). The next batch you receive though can be absolutely incompatible, despite having allegedly the same specifications.

Hopefully Mike Cook's article in this issue will help iron some people's problems out.

Flicker ridder

I AM just getting to grips with my BBC Micro and have been learning how to move user defined characters around the screen.

The methods I had used seemed great at the time, but now I feel that the desire for information increases while the information available on the subject decreases.

I have plotted and unplotted the characters but still can't get rid of an annoying flicker.

I would be most grateful if you could direct me on the right road to "smooth" graphics. – **Stuart Millard, Bristol.**

● Well Mr Millard, no promises as to dates, but we have some articles on animation of the sort you require in the pipeline – smooth graphics will soon be yours!

S'il vous plaît

WHILE much of the back-slapping and congratulation over the early issues of BBC Micro User is amply justified, it does seem to me to be quite weak in precisely those areas likely to be of most interest to owners of the BBC machine.

It manifestly is not a toy, but you place great emphasis on its games applications. On the other hand, it is perhaps not the first choice of businesses or the research scientist, yet you offer *programs for interfacing with laboratory equipment etc.*

I think we could well do with more coverage of the middle ground of home computer applications. Not business, but "business like"; not arcade action, but not so far removed from play.

What about some listings to sort out those household accounts, to assist in education or to help people bone up their French?

More listings for practical applications please. This is what many of us think the Beeb is all about. – **Stephen Ackroyd, Pilling.**

● Totally agree with you, Mr Ackroyd. I'd love to publish such programs, only they haven't been sent to me yet. Anyone out there going to send some in?

Space problem?

THIS is really a cry for help concerning the King Kong program in the April issue. Incidently, thanks for the corrections in the May issue. Although my wife and I came to the conclusion that lines 180 and 450 were wrong we were unable to amend correctly.

However having now corrected my data input I find that if I enter my name with my first score (line 240 I believe) say "No. 1 2500 Terry" immediately the VDU displays a blank window in white for the skyscraper with a cyan background. Now on the left hand side of the screen we get printed:

```
No room
>
```

and the program will run no more. From my User Guide such an error indicates no more usable memory.

Solutions which come to mind are:

- *The program is too large for my BBC "B" micro.*
- *I have a faulty RAM (ROM)*
- *There is another fault in the micro.*

By the way, we have just loaded "Deathwatch" program from your first issue and ran it until we developed the same fault after entering the fourth name score. – **Terry Summers, Sherborne, Dorset.**

● Without seeing your actual program, it's hard to say what's going wrong. King Kong uses almost all the memory, and if you've added a few extra spaces not included in the listing – which is all too easy to do with the BBC Micro – this can cause problems.

Certainly, eliminating extra spaces and resisting the temptation to "tidy up" the instructions has solved the problem for several readers.

Hard to find

I WRITE to congratulate you on the excellence of your new magazine. My confidence in the continued excellence has persuaded me to take out a year's subscription.

I was surprised to read your article on the News page of the first issue that Acorn, producing 11,000 micros a month, are now exporting because the backlog in Britain has been eased.

I placed an order for a BBC Micro at the beginning of February, and have tried all known suppliers within 100 miles of my home town with the same result – no stocks available.

I hope that Micro User can exert some influence in genuinely easing the backlog so that I and many others in the same situation might become true BBC Micro USERS. – **Alastair M. Fraser, Prestwick.**

● Acorn haven't cut back their production of BBC Micros in order to support the American drive. The shortage of readily available BBC Micros is caused by the usual April madness when education authorities realise that they've still got some money in the kitty and splash out before they lose it.

This year the BBC Micro is really in fashion, and all available supplies are quickly snapped up.

Take an indirect jump right into the middle of things..

I HAVE read with interest the first two issues of your magazine and have found it to be on the whole an excellent publication.

However, in his article on the BBC Micro's operating system (April edition) Paul Beverley stated that programmers are advised not to use the BBC equivalents of PEEK and POKE.

He compounds this by indicating that accessing memory with them is illegal in his diagram "Communicating with the operating systems".

On the contrary, we are encouraged to use these facilities – facilities which are more powerful than their equivalents in any Basic which I have seen.

What the manual does say is that we should avoid using them to alter memory locations controlled by Basic and the operating system. This means we should not use them for

- ☐ *Input and output to peripherals.*
- ☐ *Altering pages 0 to C, except the free area of page 0 (hex 70 to hex 8F).*
- ☐ *Altering the screen.*

However, we should learn to use them for storing and accessing data in the free part of RAM above the Basic program.

To do this, we must reserve space using either the special version of the DIM statement (see User Guide, page 237) or by moving HIMEM or LOMEM to leave space.

It may be more efficient to store some data in memory directly and save it as a section of memory than to use DATA statements.

For example, in a program incorporating music, all the SOUND parameters may be stored in one byte each (if you are not going to need the synchronisation or termination of sound facilities – see User Guide, page 350), whereas DATA statements would take up many more. Compare the two methods of storing one set of SOUND parameters (below).

Of course, in the second example the routine to read the data will be more complex, but if a lot of data is to be stored it will be found to be much more economical to use the indirection operators.

Having said that, I have found from bitter experience that it is all too easy to make a mess of things using the indirection operators. For example, a bug in the program could cause the POKEing of forbidden areas of memory, or even in the program. The latter will often result in the loss of the program.

Therefore although indirection is a powerful concept, it is perhaps unwise for a beginner to use it.

Finally, how about a series of small add-ons to the 1mHz bus, or user port for us solder-freaks out here.

Such things as stepper-motor

→

As a Basic DATA line:

1000	***DATA***	***1, −15, 30, 10***
4 Bytes	*1 Byte*	*11 Bytes*
&0D LSB of line number MSB of line number Length of line	*Token &DC*	*stored as Ascii characters*

Total memory used: 16 bytes.

As a section of memory

Address	*Contents*	
hex. 5000	*1*	
5001	*241*	*(2's complement for −15 in 8 bits)*
5002	*30*	
5003	*10*	*Total memory used: 4 bytes.*

MICROMAIL

From Page 107

interfaces, musical keyboard interfaces, battery backed-up calendar and digital to analogue converters would certainly ring the changes, as most micro magazines seem to concentrate on writing software. – **William Smith, Sheffield.**

● Paul and I agree with you that the indirection operators on the BBC Micro are more powerful than on any other. The subject seems to be one of "Do as I say, not as I do."

Although I must admit to breaking the rules myself, I can understand the opposition expressed to their use in any form. They can make even the simplest of programs virtually incomprehensible. And, as you point out, one slight slip and your programs tend to disappear into vileness.

You'll be pleased to know that Paul has got a whole series lined up for us solder freaks. I've bought a new iron specially for it!

Sorting out one's OS

I AM impressed at the content of your magazine. I was particularly interested with Paul Beverley's series on operating systems.

However I must say that I am somewhat confused. I bought my Model A in late January 1983 (serial number 128388) and it has a ROM operating system. The two ICs are marked as follows:

2E1
HN613128P
BO1 JAPAN
ACORN BASIC
and
2F1
HN613128P
BO2 JAPAN
ACORN OS–1

*If I type in *FX0 the answer I get is OS EPROM 0.10.*

Will you please explain which OS I have and what its limitations are. Will you please also explain how one can recognise OS 1.0 and OS 1.2. – **A. Romaine, Ripley.**

● The OS you have is indeed 0.1, and is in ROM, despite the message. Hurrying to produce the ROM, and thus avoid the much more expensive EPROM, Acorn forgot to change the *FXO message in the code. Easy to criticise, but most programmers have dropped similar clangers!

The worst thing about OS 0.1 is that its cassette filing system is unreliable – see Mike Cook's article in our first issue to settle that. Two other inconveniences are that it won't support the "sideways ROMs" – that is chips such as View and Wordwise – and also it lacks lots of the *FX calls available to the more sophisticated versions.

*FXO and Return will tell you if you have OS 1.0 or 1.2.

More joy on Figure V

HAVING already got Atari joysticks and a BBC B, I was particularly pleased to see the article on joysticks. Is it possible for you to supply diagrams showing the arrangement of the components on a piece of veroboard or whatever along with a shopping list of components?

Could you also supply clarification on Figure V, regarding which connections are to the Atari joystick and which to the Beeb.

I do not want to risk damaging the micro by making a wrong connection and being an electronics novice I need reassurance.

If you produce any other bits of hardware for home building could you please contemplate including more photographs of the circuitry and easy-to-follow diagrams so that simpletons like myself can follow them and achieve success.

For the future, you might contemplate producing "kits of bits" to support articles on hardware homebuild, or publish lists of suppliers.

I congratulate you on your excellent magazine. – **G. Shally, Newbury.**

● We shall be producing kits of bits for our future body building projects, and these will include printed circuit boards, which should help with the layout problem.

Figure V was a bit of a mess – our fault, not Mike Cook's. He makes the following points:

Where there is a single number, it belongs to the Atari joystick.

Where there are two together, the number without brackets belongs to joystick one, numbers with brackets to joystick two.

The letter G should have been the number 6, and the unlabelled resistor below it should have been 20k.

Cover story

THANK you for a very interesting first edition of your new magazine. However, the cover picture on your second edition almost put me off buying it. – **M.E. Boleleuster, Strand, Glos.**

● Some of us had doubts about the cover too, but we thought we'd solved the problem when we got Percival to cover himself up with the ape suit. Still, you can't please everyone.

And finally, with tongue firmly in cheek . . .

Missive from a faint-hearted micro user

Dear Trev,

The worst has happened. You know how Andrea has always looked down on my Beeb (incidentally I've named him Bug), well last month BBC Micro User carried an article by some fool explaining how easy it was to set up the Bug as a games machine without knowing anything about micros.

And of course last Saturday I was in the Nice Byte lusting after some disc drives when an idiot salesperson decides to sell A. some games cassettes, showing her the article and saying how easy it was. I thought he was onto a loser – after all she's always called Bug "that Space Invaders thing" – but I'd reckoned without that blasted frog crossing the road. She was entranced.

"Sweet", she said, and a love affair was born. She bought three games cassettes with her credit card and I know for a fact that she's bought at least five more since – and a joystick!

As soon as she got home it was up to the spare room with tapes in one hand and the article in the other. Why she bothered with the article I don't know. She connected up Bug by trial and error, screwing the 7 pin DIN's in with all the manic joy of Frankenstein assembling his monster. Sadly she eventually got it right and now I can't get on the thing.

She's addicted. "Just one more go, just one", is all the conversation I get out of her. The neighbours are looking at me strangely and I'm not surprised what with all the screams coming from our back bedroom – "Yes, yes, go on, go on – Nooo!"

It doesn't help that she's started wandering round like a zombie because of lack of sleep. The worst thing is that she's started talking chillingly about "her" machine.

I don't think I can stand it.

Cheers, Bob.

P.S. Good news! I can now get back on the Beeb. A. has sprained her thumb trying to put a DIN plug into the TV aerial socket.

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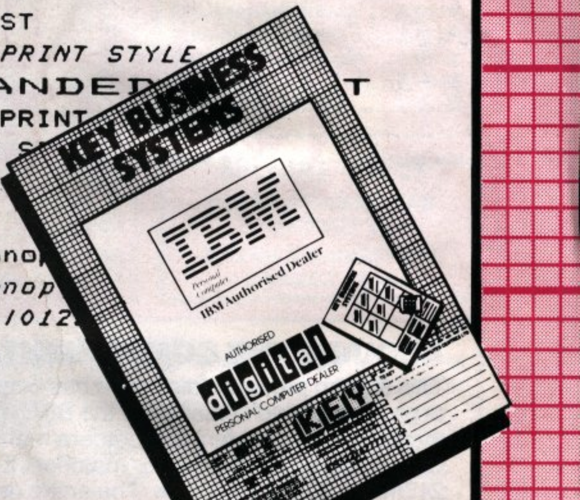

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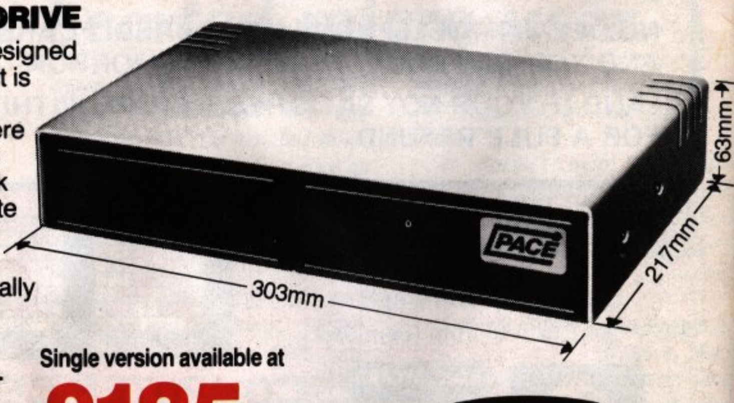

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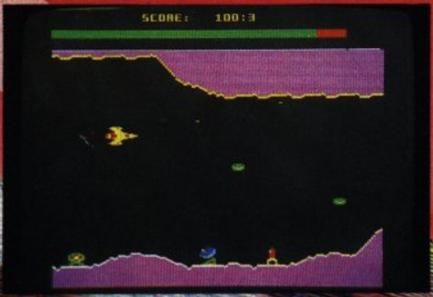

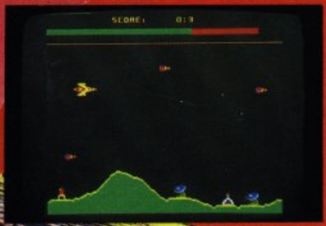

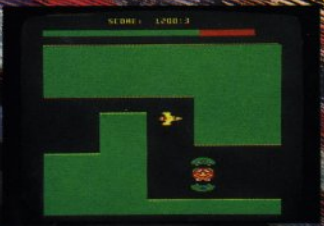

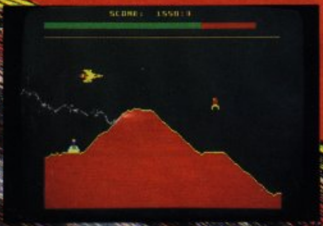

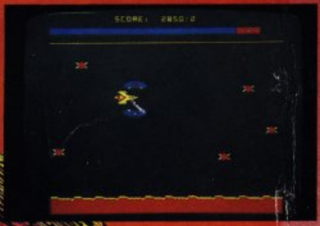

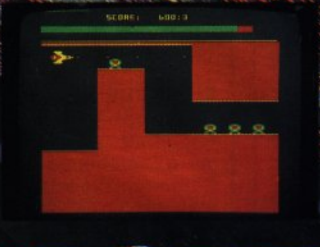

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